Industrial Engineering

Maintenance Engineering in Plants, Mills,
and Factories

Volume 88

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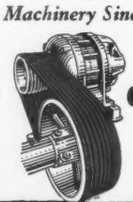

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In 1930

the advantages of modernization will be increasingly apparent

This statement is repeated—and amplified—on the first editorial page. The spirit of the statement is evident throughout the issue.

Equipment is of paramount importance in modernization—hence the review of equipment that makes up the bulk of the issue—beginning page 16.

And a knowledge of recent progress in the major development of equipment is necessary—hence the "progress" articles dealing with electrical, mechanical power transmission, and materials handling equipment—these articles preceding the review details.

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INDUSTRIAL ENGINEERING

PLANT ENGINEERING IN INDUSTRY

A McGraw-Hill Publication—Founded 1882

Volume 88 CHICAGO, JANUARY, 1930 *Number 1*

In 1930 the advantages of modernization will be increasingly apparent

AS a distinct part of its job of telling what to do, when to do it, and what to do it with, *Industrial Engineering* devotes this second annual Equipment Review to

"What to Do It With"

. . . The new year probably will be a good one, thanks to the will to make it so and our sound economic structure. But it promises to be a year of still keener competition.

. . . With attention again principally directed toward making money by producing, alert management will bring about the elimination of wasteful methods, inefficient equipment, surplus personnel.

. . . During periods of widespread prosperity even the plant strongly marked with the signs of obsolescence can make money. During periods immediately following deflation obsolete buildings, equipment, and methods constitute a shaky foundation.

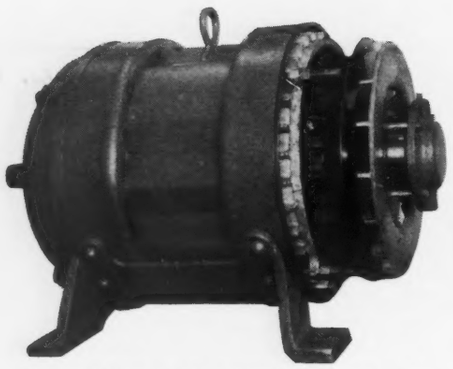
. . . Plant engineering, in its function of maintaining the plant for uninterrupted production, carries responsibilities that abound with opportunities for modernizing plant and equipment.

. . . Preventive maintenance and replacement; structure repair and minor construction; economical power transmission; wasteless handling of materials; providing the correct temperature, atmosphere, light, and communication; protecting the plant—these offer some of the bigger opportunities.

. . . To meet the responsibility of modernization men in charge of plant engineering must know not only *what to do,* and *when to do it,* but *what to do it with.*

. . . What to do it with, of course, is modern equipment. Recognizing this important place of equipment, *Industrial Engineering* herewith presents its second Annual Equipment Review, an issue designed to be kept on the desk as a constant guide in the selection of the right equipment at the right time.

1929 ELECTRICAL



The winding of this totally-inclosed, fan-cooled, squirrel-cage motor is protected by a sheet-metal housing.

PROGRESS during the past year in the development of new types of industrial electrical equipment, and the refinement of existing designs, has indicated a healthy demand for improved equipment as well as ample ability of manufacturers to satisfy that demand. A large number of new or redesigned items of equipment have been placed on the market and, although few if any involve the use of radically new principles, ingenuity and designing skill are much in evidence and the new models frequently tend to foster changes in practice.

ALTHOUGH it is impossible to discuss in one article all of the developments, the examples given below will serve to indicate the present trends in the design of the more important items of industrial electrical equipment. Only a few illustrations accompany the article; however, most of the developments are illustrated in the equipment-review section of the issue and have been illustrated in the equipment-news section during the year.

MOTORS

The trend in the application of a.c. motors has been toward "across-the-line" starting. Up to 30-hp. rating the National Electric Light Association requirements, hence those of the central station, have been satisfied. Although the manufacturers are making these motors up to about 100-hp. rating with high starting torque and up to 200 hp. with normal starting torque, the utility companies object to the starting current drawn by the larger sizes. It also behooves the operator of a small power plant not to use too large a motor directly across the line, even though it has been designed for this purpose, because the heavy starting current may cause trouble by opening the main circuit breaker.

For years inclosed motors were made in a frame size somewhat larger than used for well-ventilated open motors. A recent departure is found in motors sealed in sheet copper endshields, with the usual, bracketed endshield outside of the copper for mechanical support. Over these copper covers air is circulated by means of fans on the shaft. Practically the same horsepower can be developed as in an open motor, resulting in a smaller frame and less expensive inclosed motors.

Another manufacturer has developed an inclosed motor using a thin iron protection over the entire winding. The endshields are sealed through machined surfaces. A fan circulates the room air rapidly over the inclosing surfaces for cooling purposes. Both of these designs produce a compact motor for use where dust, steam, or corrosive fumes are present.

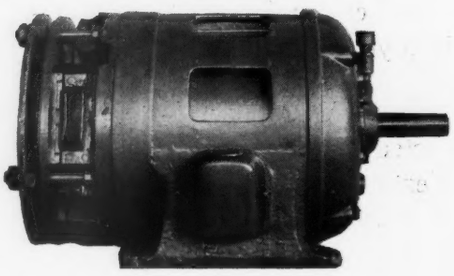
Several manufacturers have developed inclosed motors built in larger frames than used with open motors of the same horsepower rating, the exterior being made either of chemical-resisting materials, or covered with compounds having that nature so that these motors may be operated in an atmosphere of highly corrosive chemicals or explosive gases.

One manufacturer has recently developed a motor in both alternating- and direct-current types for use in mines. This motor meets the rigid requirements of the Bureau of Mines to the effect that should an explosion occur inside the motor it will not be communicated to the surrounding atmosphere.

It has been customary in the past to build and mount magnetic brakes as separate units. A motor has been developed for hoisting service in which a magnetically-operated disk brake is mounted within the end-shield.

Inclusion of a speed-changing device as an integral part of the motor is another development of interest. One manufacturer is furnishing small motors (1/30- to ¼-hp. rating) with an integral worm gear reduction unit giving ratios up to 50:1.

Motors of another make are available in sizes up to 25-hp. rating with an integral speed changer of unique design. Above this rating the motor and speed changer are built as separate units and mounted on a common bedplate. Changes in speed are secured through hardened and ground steel surfaces rolling upon each other under sufficient pressure to prevent slip. No gears or other devices of this sort are employed.



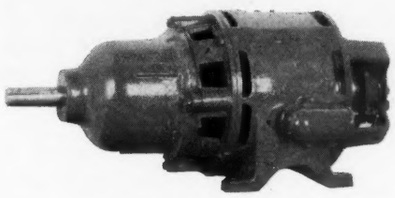
A magnetic brake is built into this motor, which is designed for driving electric hoists.

Synchronous motors with high-re-

L DEVELOPMENTS

By J. G. BERGER
Consulting Engineer
Newark, N. J.

actance starting windings, together with other special types of synchronous motors, have appeared on the market during the past few years. Hence, one can now do a great many jobs with synchronous motors that formerly were impossible, and correct power factor at the same time. In fact across-the-line starting with synchronous motors is now an established procedure.



Here is a 15-hp. motor with a speed changer built into the rear endshield.

The past year also saw the development of a brushless condenser-type, single-phase motor which is said to be comparable to a polyphase motor in respect to starting and pull-out torques, power factor, and efficiency.

Control and Protective Equipment

In the design of control and associated equipment there is a strenuous endeavor to make the motor do what the job requires, when required, and in the manner wanted. At the same time the motor and driven equipment must be protected from abuse by a careless operator, as well as guarded against serious fluctuations in the supply of electric current. Hence, literally hundreds of new control and protective devices reach the market each year. It is, therefore, possible only to indicate the trend and cite a few typical cases.

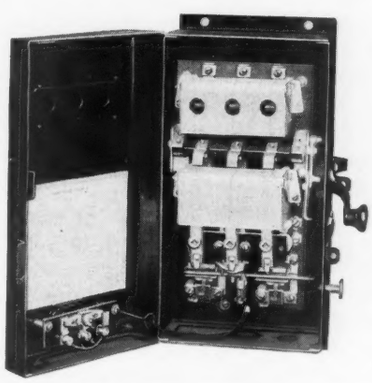
The open, fused knife switch has disappeared to a large extent. It was replaced by the inclosed, fused safety switch which in turn is competing with the magnetically-operated switch with overload relays, having push-button start and stop. The underwriters still require some means of breaking a circuit by hand so that work can be done on the magnetic switches or control equipment. For this latter purpose an unfused safety switch will serve.

Incidentally, magnetic switches in combination with fused, manually-operated switches, for the dual purpose required by the underwriters, are now available.

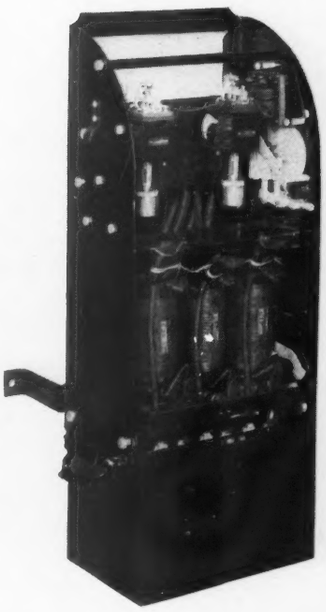
The older dashpot and bellows types of relays have been superseded by thermal relays that depend for their action on the expansion and contraction of metal strips or coils as the temperature increases or decreases.

There has been much activity in the design of across-the-line starters, whereby motors can be started merely by pressing a button. By properly locating these stop buttons the motor can be controlled from any decided location. These switches are now available in both reversing and non-reversing types from several manufacturers.

Where current is transmitted long distances, short interruptions of voltage, say from one to several seconds, sometimes occur. There has been placed on the market a "time release" device that can be used with compensators or circuit breakers so that a motor will be kept connected to the line for about 1½ seconds after the voltage goes off, before the compensator or magnet switch trips out. This device operates on the principle of using the inertia of a flywheel to hold back the tripping lever for a predetermined time.



Combination across-the-line starter and motor circuit disconnecting switch.



In this compensator, which is designed for use in gaseous atmospheres, the starting switch is immersed in oil and mercury-tube switches are used in place of the usual contact tips of the dashpot relays.

Another type of undervoltage device is designed to open the circuit breaker protecting an a.c. line within any desired time limit ranging from approximately one second to one minute after a voltage failure.

In connection with the use of explosion-proof motors it has been recognized that breaking of electrical contacts should sometimes be done under oil, so as to avoid formation of sparks in an explosive atmosphere in mines or factories. To meet this need a compensator in which all open sparking or arcing is eliminated, has been developed. The starting switch is oil-immersed and mercury switches have been substituted for the usual relay contacts. A small magnetic switch with oil-immersed contacts has also been placed on the market. It is intended for use in gaseous atmospheres or where highly-corrosive fumes are encountered.

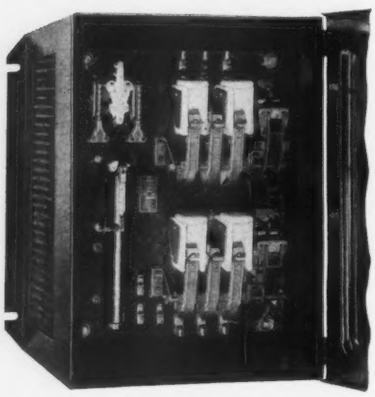
Several makes of dust-tight and weatherproof across-the-line starters are likewise now available for use in locations where excessive amounts of

dust are present, or the control equipment is likely to be splashed with water or other liquids.

Progress in the design of control equipment has not, however, been confined to across-the-line starters. One large manufacturer has recently designed reduced-voltage and full-voltage starters for synchronous motors to make the operation of starting both simpler and safer.

An automatic starter for squirrel-cage motors has been developed by another manufacturer. In this starter the resistance is cut out in a definite period by means of a compensated thermal timing device which has a wide range of adjustment.

These examples are merely typical



An adjustable, compensated, thermal timing device is used to cut out resistance in this automatic starter for squirrel-cage motors.

of the activity of control manufacturers in developing and refining industrial control equipment.

Much work has been done in determining the characteristics and effect of lightning on transmission lines with the object of improving the protective equipment. The details and results of this work cannot be recounted here, but it is interesting to note that investigations in the field on full-sized transmission lines with a portable lightning generator and the cathode ray oscillograph have revealed the fact that the choke coil, used for years in lightning protective systems, was of little actual value in this service and its use has been discontinued by one manufacturer.

Circuit breakers have come in for their full share of attention and a number of improvements in the details of construction have been incorporated in the types now available. Several manufacturers have materially expanded their lines to include additional sizes and types required to meet present demands. One feature of interest has been the development of several small circuit breakers, for protecting motors up to 1- or 2-hp. rating.

A distinct advance in the method of confining and smothering the arc produced by opening contacts under load has been made by one manufacturer. Briefly the arc is blown into a chamber by a magnetic field and broken up into a number of short arcs, each of which is magnetically rotated until it is extinguished as the line current passes through zero. This method of extinguishing the arc is being applied to both circuit breakers and across-the-line starters.

Wiring and Wiring Devices

In this important field many improvements in details have been worked out during the past year, existing lines of equipment have been broadened by the addition of new designs, and some developments of more than passing interest have been announced.

There have recently been placed on the market flexible distribution systems with power outlets, for industrial use. A system comprises a steel housing, which comes in standard lengths, provided with mounting supports and lined with an insulating material to protect the busbars which it contains. Busbars are used throughout, to the exclusion of wires and rigid conduit. Plugs and fittings of special design have been developed for quickly making taps for branch lines or machines. A variation of one system provides means for taking current from busbars through a trolley carriage to operate portable tools.

Another manufacturer has introduced a threadless, thin-walled rigid conduit made from cold-rolled steel. The wall of this conduit is about one-third the thickness of standard conduit.

Along with these developments have come a number of improved designs of conduit fittings, switches, plugs, receptacles, and other devices for both special and ordinary service.

Transformers

Recent improvements in transformers are confined more to details than radical changes. An outstanding improvement has been the providing of a suitable electrostatic shield to insure uniform distribution of the impulse voltage between the coils and turns of windings. These impulse currents are often produced in long transmission lines by lightning discharges and switching operations. In the past this condition has at times resulted in transformer burnouts, from the shock and heavy surge of current.

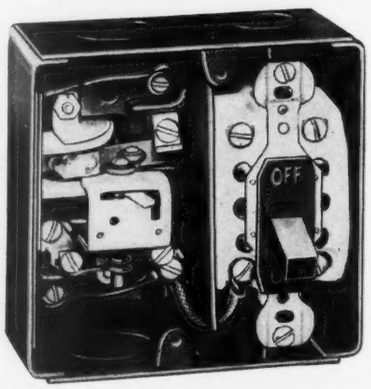
Lighting

One of the trends in industrial illumination is the increasing use of higher levels of illumination. New installations employing 15 to 30 foot-candles are not at all uncommon, and in some instances a level of 40 to 60 foot-candles for general illumination over large areas has been found economical. For local lighting of special work much higher values are used frequently.

An increasing interest is being shown in special lighting for specific purposes. In a number of plants group lighting of machines has been adopted. In order to obtain the greatest utilization more and more attention is being paid to the control of light to meet the requirements that group lighting imposes.

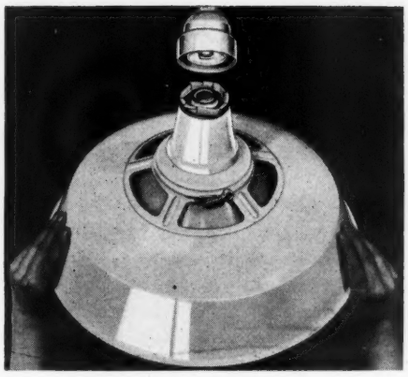
A number of improvements in the details of lighting equipment have been announced during the year. One is a reflector and lamp holder unit which can easily be unlocked and removed from the terminal base by turning it through a small arc. This outfit is designed to facilitate quick changing of lighting units. The dirty unit can be removed and a clean one inserted in its place in a moment.

Another manufacturer has introduced a line of lighting units that involve an application of indirect



One of the small circuit breakers that have been developed for protecting a.c. and d.c. motors up to 1- or 2-hp. rating.

lighting. The porcelain-enamel reflectors have a special reflecting finish, whereas the lower portion of the lamp bulb is silvered. Light is thus reflected up into the reflector, which then directs it outward and



The reflector, lamp, and glass enclosing globe of this lighting unit can be removed as one piece by a counterclockwise turn through a small arc.

downward. At the same time the covered bottom of the bulb prevents direct light from reaching the eye.

Welding

Increasing interest and widening application of arc welding are plainly indicated by the activity of manufacturers in introducing improved designs of generators and welding accessories. Several gasoline-engine-driven units in both portable and stationary types have been placed on the market recently. Such units are now available in any desired capacities required for industrial service. Worth-while improvements in the characteristics of welding generators and in the control equipment, resulting in better all-around performance have been made. One gasoline-driven unit provides automatic engine regulation from idling to welding requirements.

Improved electrode holders embodying desirable new features have made their appearance. Water cooling is employed in one design that is intended for heavy-duty manual welding by the carbon arc process.

Electric Heating

Interest in the advantages of electric heat for industrial applications and activity in developing new designs of furnaces and ovens have not abated. The entry of one of the largest electrical manufacturers into the electric furnace field was followed shortly by the announcement of several new types of electric furnaces and a new method for producing a short-cycle anneal of malleable iron. In the field of localized and other low-temperature heating applications, many improvements have been made and new devices of various kinds introduced.

Among the new furnaces is a vertical, cylindrical model which incorporates a motor-driven agitating fan, and was designed for nitriding or high-temperature air drawing.

A mesh belt conveyor furnace was designed for continuously heat-treating large quantities of small parts. The principal features of this furnace are the automatic feed and discharge, which are accomplished by a mesh belt conveyor of heat-resisting alloy.

Another furnace was designed for annealing alloy steel to obtain variable heating and cooling cycles. This furnace is lined with light-weight refractories of low thermal capacity which make it possible for the furnace walls to heat or cool very quickly. Variation of the cooling period is facilitated by the use of cooling coils and a ventilating system that can be sealed tight by insulated doors during the heating period.

A metal melting pot having a bottom-pouring spout was announced during the past year. It is applicable in cases where large quantities of metal are handled and ladling out is impracticable.

Instruments

Present-day operating conditions are making the use of testing instruments of various kinds an essential part of the operating and maintenance program. Radical developments in the design or principle of operations are comparatively few, but improvements in details and, in some cases adaptations to new uses, have not been lacking.

Measurement of heat loss through surfaces such as heat-insulating materials has always been a rather troublesome procedure. This need for improvement has recently resulted in the introduction of a heat flow meter which indicates directly on a scale the rate of heat flow through any surface, in any convenient unit.

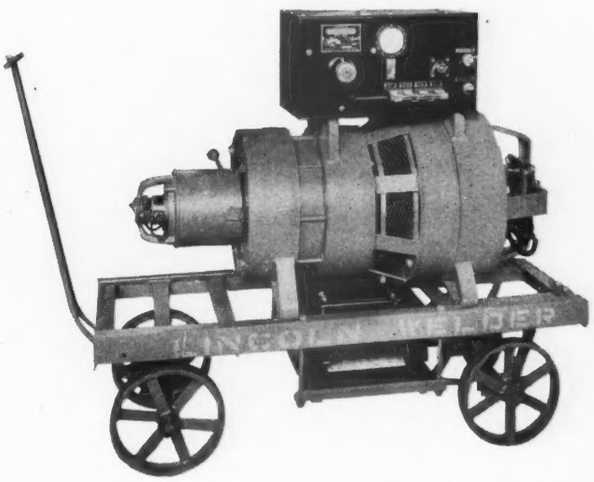
In the field of portable testing instruments there has been placed on the market an outfit that combines in one unit the facilities for making Wheatstone bridge measurements at 250 volts and insulation resistance tests at 500 volts. With this instrument it is possible to measure resistances ranging from 0.01 ohm to 100 megohms.

Repair Shop Equipment

With the increasing use of electrical energy in industrial applications, adequate facilities for repairing motors and other electrical equipment have assumed a position of growing importance. In large industrial, as well as commercial, repair shops home-made or obsolete devices are being forced out by modern equipment that will do a better job in less time. Among the machines that have been placed on the market are a group winding head with which coils can be made singly, or in groups of two, three, four, or six or in a number of different combinations.

Another manufacturer has brought out a complete series of heavy-duty field and transformer coil winders that will handle a wide variety of work.

With these there have come improved designs of growlers, provided with ammeters for testing armatures and stators, wire strippers, and a variety of other accessories and tools for facilitating and cutting the cost of repair work.



Portable arc welding outfit for a.c. power supply. The control equipment for both motor and generator is mounted on one panel.

Mechanical Power Trans n

By WILLIAM STANIAR

Mechanical Power Engineer
E. I. du Pont de Nemours & Company
Wilmington, Del.

BASED on the demands of industry for more economical and efficient mechanical power transmission, a number of important developments have occurred in this field during the past year or so.

Leather Belting

There has been little change in the actual characteristics of the various leathers, but leather belting manufacturers have been improving the quality of their products to meet the exacting demands imposed by high speeds, high ratios, high powers, and the wear and tear of modern industry.

The trend of the consumers' demands is toward the use of special-tannage and the higher grades of oak-tanned leathers. Special tannages fabricated with a cement insoluble in water, and waterproof-cemented, oak-tanned leather belts, although slightly higher in initial cost, have proved in a majority of instances to be better investments and have lowered maintenance costs, in addition to assuring a more even flow of production per unit.

By the concerted efforts of leather belting manufacturers, the ultimate tensile strength of leather has been raised 25 per cent by improved tanning methods that not only lengthen its life materially under normal operating conditions, but give it greater resistance to the severe shock loads of various drives and the punishment of short-center work.

Rubber Belting

During the past year, major improvements have been noted in the construction of a few brands of friction-surface rubber belting.

Ply separation and breaking of the seam binder strip appear to have been overcome in one make by the introduction of a strip of rubber in the second ply of the fabric. It is claimed that this improved construction provides an elastic hinge in the center of the belt, so that it conforms more readily to the crown of the pulley.

Corrugated construction used with some types of rubber V-belts for short-center drives.

More flexibility and assurance against ply separation are claimed by another improvement in construction wherein the duck is not folded; it is simply cut to size and the plies frictioned together. This procedure is based on the principle that a laminated or raw edge is more flexible than a folded one.

The first genuinely endless rubber belt without internal splice has recently been placed on the market. A section of this belt, with the rubberized fabric envelop laid back is shown in one of the illustrations. It is of cord construction and at the present time is supplied in widths from 3 in. to 16 in. inclusive, and from 12 to 50 ft. in total endless lengths.

Shafting

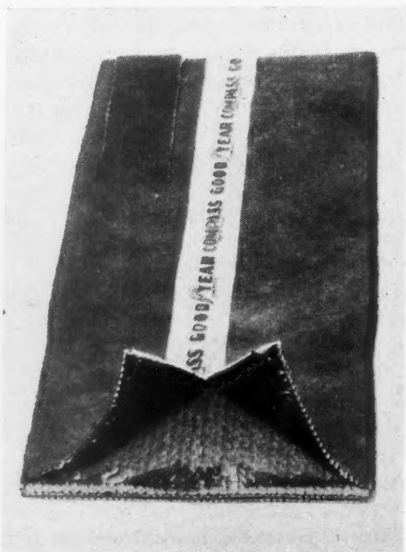
By reason of their superior strength, elastic qualities and ductility, alloy steels have come to be used extensively for power-transmitting shafting. For the average line-, head-, or countershaft drive the use of cold-rolled steel shafting has seemed to be practical. Recently, however, 2½ to 3½ per cent nickel steel has, in many instances, been substituted for cold-rolled steel because of the possibility of using smaller diameters for the same loading, with the subsequent reduction in sizes of all other transmission appurtenances.

The general inclination in industrial plants where speeds are low and power loads heavy, is to adopt alloy steels, such as 3½ per cent nickel and vanadium. The 3½ per cent nickel steel has an ultimate tensile strength of 110,000 to 125,000 lb. per sq. in. and an elastic limit of 80,000 to 90,000 lb. per sq. in. as compared to 40,000 to 50,000 lb. ultimate for cold-rolled steel.

It is obvious that the use of such steels for line-, head-, and countershafting materially reduces the sizes of all equipment entering into the transmission of power and makes for stronger, safer, and cheaper operation. Vanadium-steel shafting, in addition to having great strength, possesses high anti-fatigue qualities; therefore, it is used largely where shock and vibration are encountered.

Hangers and Supports

The trend in methods of supporting power-transmitting shafting is strongly toward standardization. Although there have been no radical changes in details during the past year, the factors of rigidity and more positive alignment are being given serious consideration. The ball-and-



An endless rubber belt with the rubberized fabric covering pulled back to show the cord construction.

s mission During 1929

socket and four-point suspension hangers, in steel or cast-iron construction, are now adaptable for the babbitted-box or any type of anti-friction bearing, size for size, and are almost perfect in their alignment facilities and bearing accessibility.

Where extreme rigidity is required on line- or counter-shafting the cast-iron sling hanger equipped with adjustable wedges and rigid pillow blocks is being employed instead of the usual drop hanger.

Slotted and socket inserts for supporting shafting in industrial buildings of concrete construction are not new, but this superior method of supporting mechanical transmission lines is rapidly taking the place of the stringer method.

Bearings

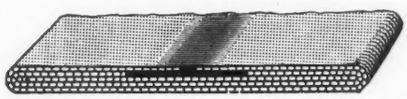
In keeping with the desire of modern industry to lower power costs and increase production, the trend is toward the use of anti-friction bearings for industrial power-transmitting shafting. Hence, during the past year or so more attention has been paid by bearing manufacturers to the improvement of this type, rather than the older form of babbitted, self-oiling lineshaft boxes and pillow blocks.

The flexible roller bearing has recently been improved by substituting two cages of short rollers for one cage of long rollers. This change provides better lubrication facilities, and entails less bending of the rollers caused by the inaccuracies of the shafting.

Pulleys

With perfection attained, so far as power requirements, balance, and reliability are concerned, in the cast-iron, steel, and wooden pulley, the general effort of pulley manufacturers appears to have been directed toward the production of a better motor pulley—a logical move because of the great demand for and inherent weaknesses in most of the present types. The motor pulley is subjected to strains, high speeds, and wear and tear given to no other pulley in the transmission installation. Cast-iron and steel motor pulleys are satisfactory where they are adaptable; therefore, the trend in improvement is in the paper, fabric, and wooden types, because these are more efficient for high-speed work, owing to their higher frictional qualities.

In actual transmission practice the cast-iron, pressed-steel, and wooden lineshaft pulley each has its place, but the forward movement is toward



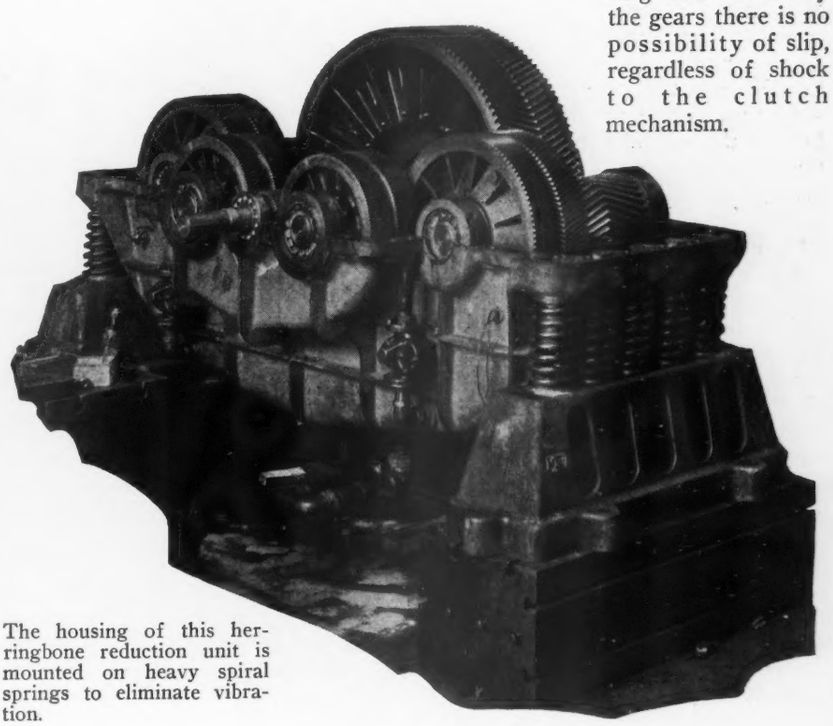
A rubber strip is used in the second ply of this rubber belt to prevent ply separation and increase the flexibility.

the elimination of the ordinary bushed loose pulley, which has always been a bugbear to the maintenance man. The modern loose pulley, equipped with either ball or roller bearings, is used exclusively today in the majority of industrial operations, because it entirely prevents lubrication difficulties and practically eliminates maintenance costs.

Clutches

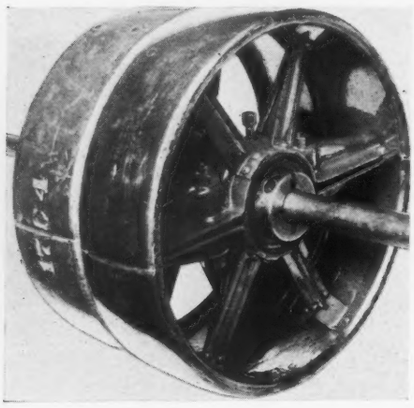
The friction clutch is more popular now as a means for gradually engaging and rapidly disengaging a load than it was a year or two ago. This is, no doubt, due to the more extensive use of chains and other non-shiftable transmission mediums. There are usually a number of mechanical means of accomplishing certain results; therefore, there are a number of friction clutches on the market.

One fairly recent departure is the friction pick-up and positive-lock clutch, which has invaluable features when use of a clutch is necessary in the presence of flammable gases or vapors. When a clutch must withstand alternating shock loads, instead of a smooth pull, there is always slight slippage on the friction blocks or surfaces, regardless of the friction mechanism design, and heating with occasional sparks is the result. The type of clutch mentioned picks up the load by the internal expansion of an asbestos ring against the inside of the sleeve drum. When this drum acquires the speed of the driving shaft, circular, engaging, internal and external small-pitch gears are brought into mesh by a further movement of the shifting lever. When the load is brought up to speed by the expansion ring and locked by the gears there is no possibility of slip, regardless of shock to the clutch mechanism.



The housing of this herringbone reduction unit is mounted on heavy spiral springs to eliminate vibration.

In the direct connection of driving and driven units, rigidity is not only impracticable—it is almost impossible to attain; therefore, the increasing use of motors direct-connected to the driven mechanism has resulted in more attention being paid to the flexible coupling than ever before.



This pressed-steel loose pulley turns on tapered roller bearings.

Two flexible couplings of exceptional merit have recently been introduced. In one, the flexibility of the silent chain has been utilized in conjunction with two silent chain sprockets, simplicity being the keynote of the design. It consists of a ring of silent chain meshed on two sprockets. The guide groove in one sprocket holds the chain in place, whereas the other sprocket is free to float under the chain.

The design of the other coupling is such that a center floating member is constrained to slide across the face of one coupling flange on a line passing through the center and at the same time is free to slide across the face of the second flange in a direction at right angles to the first. This arrangement provides complete flexibility without the use of flexible materials.

Rigid couplings are also used extensively, and the trend is toward the use of the finished, flanged type because it assures accuracy of alignment and a stronger connection than the so-called sleeve-type, solid, or split coupling. Where true accuracy of shafting is imperative the flange coupling is usually pressed on and centered with the shaft, establishing in reality one continuous line of shafting.

Short-Center Drives

Progress in the development of the short-center drive has been largely influenced by the constantly-increasing demand for a short connection between driver and driven. During the past year or so, however, there have not been any major improvements in existing methods such as the silent or roller chain, the automatic idler system, or the multiple V-rope method. Minor improvements have been made in the silent chain, such as the adoption by one manufacturer of chrome-nickel steel links for short-pitch chains. This improvement allows the use of narrower chains for a given load and, therefore, results in lowered cost to the consumer.

Certain manufacturers of the multiple V-fabric and rubber rope short-center system claim more flexibility and longer life by the use of a corrugated V-rope. The general tendency of industry is to adopt one of the short-center drive methods mentioned, because of the advantages they offer, as contrasted with the inefficiency of the open, flat-belted, short-center installation.

Speed Reduction Units

In view of the universal use of the electric motor, with its inherent characteristic of operating at high speed, the worm, spur, herringbone, and spiral bevel gear reduction units are continuing to be extensively employed. Hence, manufacturers of these units are constantly endeavoring to improve their present products and create new devices for the purpose. During the past year or two minor improvements in bearings, lubrication facilities, housings, and in the metals employed in construction have been incorporated in all types of speed reduction units.

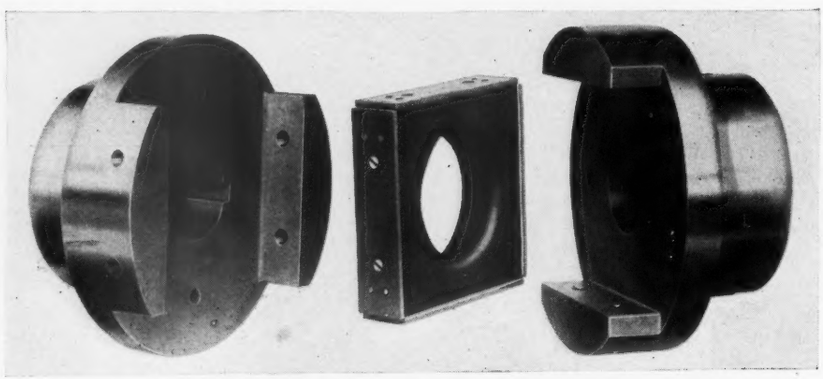
The gear reduction unit of any type gives a non-flexible connection which has, no doubt, been responsible for the recent introduction of the steel roller and silent chain in place of gears in speed reduction units for low ratios. The steel roller chain is employed, and recently there has appeared on the market an inclosed reduction unit utilizing the silent chain. This unit is capable of handling powers up to the capacity of the silent chains, and is at present made in single and double reductions.

A herringbone reduction unit of foreign manufacture has recently created considerable interest in this country because vibration is claimed to have been eliminated; this is an invaluable feature for certain installations. Spiral springs are employed on each end of the housing to eliminate vibration.

Lubrication

The past two years have proved beyond a doubt that industry is realizing the value of proper lubrication for power-transmitting equipment, as well as for machine tools and other production equipment. The present trend is to do away with antiquated, inefficient hand-oiling methods, which have resulted in more burned-out bearings than almost any other cause. Automatic lubrication pays because it delivers the right amount of lubricant at the right place at the right time, by the wick, ring, chain, collar, capillary, or header system. These systems require attention periodically only.

One of the latest methods of lubrication is that known as the flood system, which in reality involves a continuous circulation of oil through the parts requiring lubrication by means of a pump operating in conjunction with a filter. This system is employed on the drier rolls of paper machines, on both gears and bearings of steel and rolling mill equipment, and in other like applications.



In this flexible coupling the sliding disk transmits power from one flange to the other, and provides flexibility.

MODERNIZATION

KEY WORD FOR 1930 BUSINESS

By FREDERICK M. FEIKER

Managing Director
The Associated Business Papers

Hoover's Conferences Have Dramatized Lessons Learned in 1929 — Wage and Employment Levels Maintained — Construction Will Lead in 1930 — Profitless Prosperity Overcome.

MODERNIZATION will be the key word of the business year ahead. In spite of the recession of business during the last two months the year 1929 has been one of the largest in volume and profits of any year since the war.

The editors of the National Conference of Business Paper Editors and The Associated Business Papers, expect that the three cardinal points brought forward by President Hoover's conferences on business will be put into action. The points—namely, immediate fulfillment of construction programs in major utility fields, the maintaining of wage rates and the modernizing of plant equipment and business methods,—will set the stage for a volume of business in 1930 at least equal to that in 1929.

Analysis of reports in several fields, including iron and steel, machine tools, construction and building, electrical equipment, furniture, wearing apparel and automobiles, indicates that the so-called era of profitless prosperity was overcome during 1929 and the reports indicate that with money available for investment in capital improvements that will reduce costs and with an increasing volume of commercial research to improve sales methods, more business men will improve profit margins by the application of principles dramatized by President Hoover's conferences.

The fields which have shown the greatest improvement are those in which management has definitely undertaken to reduce unit costs, without reducing wages, by improvement in plant facilities and technique or in merchandising methods. These practical lessons in better business may be expected to be carried out even more widely in the year 1930. It is evident that the gains that can be made by the shaking out of the wastes due to obsolete machinery, poor credit relations, high cost selling, and other wasteful practices, will more than offset any reduction in the volume of purchasing.

Some editors still report their industries with over capacity, but in the same reports they indicate management willing to scrap obsolete plants and equipment with the view of matching capacity with demand on a lower unit cost basis.

In industrial fields the editors report that the bulk of industrial construction work will be along lines of modernizing existing plants and replacing obsolete structures and equipment. In the automobile tire field $15,000,000 will be spent for plant expansion and new equipment by manufacturers. In the iron and steel fields, 1930 will see $500,000,000 spent for expansion of which about one-third will go for plant improvements. In the meat packing industry it is anticipated that expansion during 1930 will be restricted to the vegetable oil and inedible by-product division.

Among the industries where the editors particularly expect that replacement of obsolete machinery and equipment will play an important part during the coming year are textile, building, industrial power plants, cement, furniture, plumbing and heating fixtures, fuel oil burners, motor bus lines, baking companies, hotels and commercial laundries.

In the textile field, modernization work is planned both as an immediate stimulant to general prosperity and as foundation work for more effectively meeting competition. In furniture manufacturing, 1930 will see approximately $5,000,000 spent on plant improvement. In the cement and allied fields, plant construction for 1929 was below 1928. The year 1930 will see reconstruction work undertaken to reduce costs, as this industry already has over-capacity.

In the matter of wages and employment the editors consider that 1929 was a good year and the prospects for 1930 are "good or better." There were a number of cases where a slight rise in wages for the past year was reported and only three industries where the wage trend was even slightly downward. The balance reported that wages remained approximately unchanged throughout the year. In employment, the concensus was that 1929 had not been marked either by abnormal shutdowns or unusual activity and that both present employment and wage levels will continue.

The introduction of automatic machinery as a means of reducing costs and increasing production has not increased unemployment. The editors report that the workers so displaced have been reabsorbed, generally by the same industry, and kept employed in other branches largely by work made possible by increased production. This is particularly true of automobile manufacturing where also the average employment throughout 1929 was higher than during the previous year and the wage trend was more markedly upward than a year ago.

The year 1930 will prove the worth of President Hoover's business conferences. These already held have largely written off the psychological effects of the stock market collapse. Recessions in some lines due to overproduction will be compensated for by the heavy construction, maintenance and modernization programs already agreed to by great groups of business. Thus, in general, the members of the National Conference of Business Paper Editors consider that the coming year already shows evidence of normal business levels.

Progress in Materials

Abstract of report dling Division of Mechanical

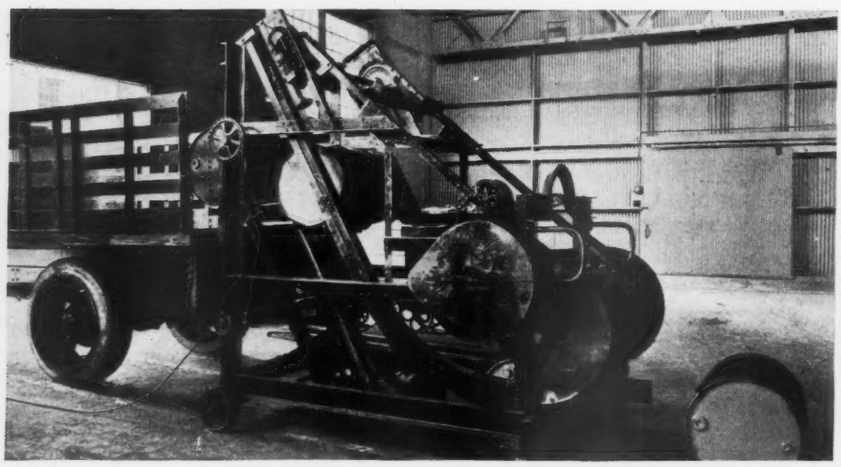
MANUFACTURERS of materials-handling equipment report increasing interest on the part of industry, stating that they are now frequently called into consultation when plans for changes or additions are in very early stages so that the scheme or plan under consideration may be developed with particular reference to proper materials handling. They report also that the increased output per unit of machinery has been a big factor in making proper handling methods a necessity. Another very important development seems to be the fact that the average manufacturer now has generally gotten away from the thought that his product could not be handled on chains or conveyors because it was "entirely different."

Clay Products

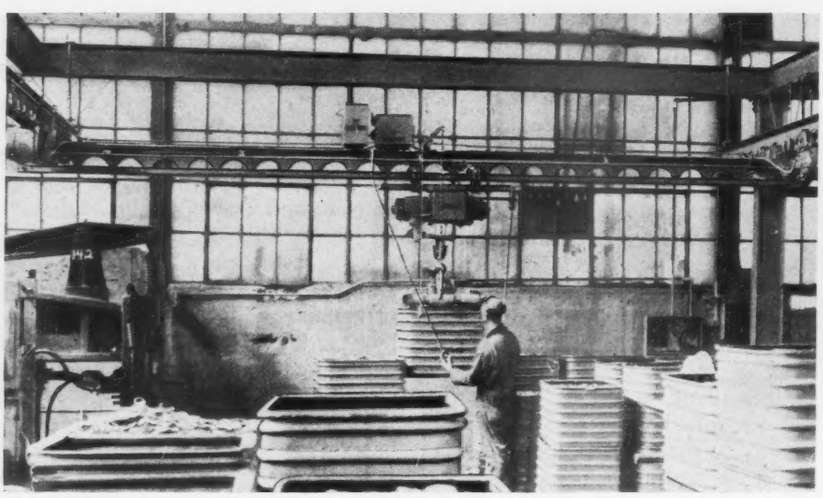
The tremendous increase in the cost of common labor compelled the manufacturers of clay products to seek mechanical replacement of common labor if the cost of their products was not to become prohibitive. Steam, gas, or electric locomotives and cars have replaced the mule carts that brought clay from its source to the plants, conveyors have replaced wheelbarrows in the plants and shipping yards, and tractors convey the finished product, deliver coal to the kilns, and remove ashes and waste material. The clay-products industry has progressed more in the matter of materials handling during the present century than during several hundred years previously.

Railroads

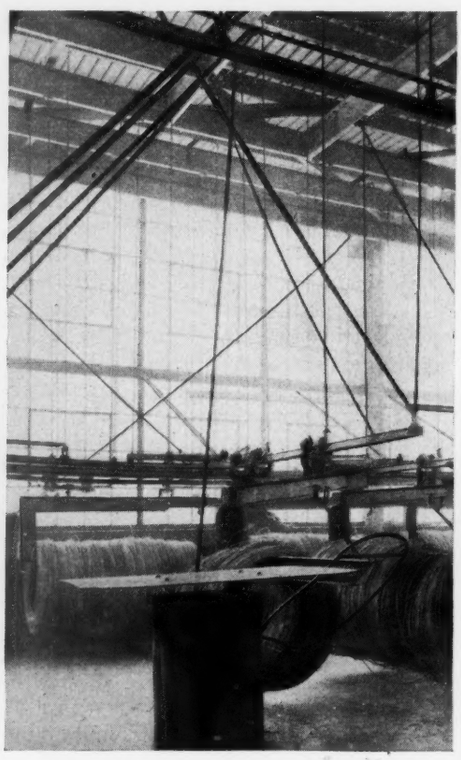
Several of the railroads surveyed have made elaborate studies of the problem of handling and transporting parts and material. Electric hoists on individual cranes and additional installations of traveling cranes have served to reduce handling of parts in process of manufacture or repair in the main shops. Motorized delivery systems have been installed to place material at the point of use



Portable barrel and drum loader for elevating filled drums from the shipping floor to trucks or cars.



Power-operated transfer bridge which locks at both ends without discharge points and permits moving the hoist off either end.



"Hairpin-hook" flipping device. Wire is moved through the mill, 3,000 lb. to a hook. By means of the flipping device, installed

Handling During 1929

of Materials Han- American Society of Engineers

and have served to eliminate the expensive and time-consuming method of handling parts by manual labor. In many shops electric platform trucks are now used to handle parts and materials that are loaded on skids.

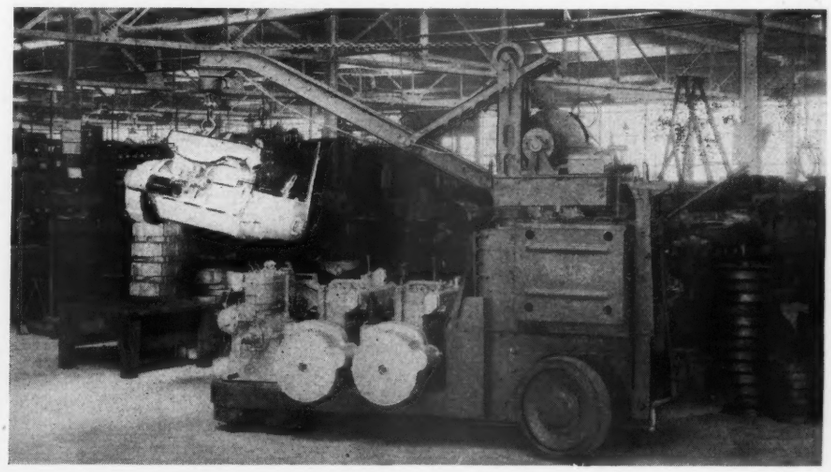
An interesting development in both car and locomotive repairs, especially coach repairs, has been the increased utilization of the overhead monorail.

Packing Industry

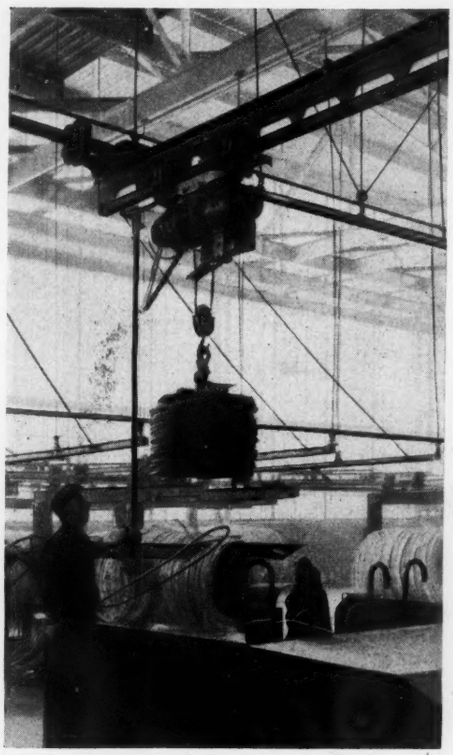
There were a number of developments in packing-house processing during the past year. Gasoline tractors have been designed which have the approval of the insurance companies for use under packing-house conditions. A scale used quite extensively in the weighing of coal from coal mines has been adapted to packing-house requirements, automatically records the weights of products upon a tape, and does away with a scaler. A truck has been perfected that will handle conveniently a very much larger quantity of packing-house produce from departments or assembly rooms directly .o the cars.

This year there has been brought out a truck, the battery of which is mounted above the deck directly over the front wheels next to the dash. In this position it acts as a counterweight for the overhung loads for which this machine was designed, i.e., cranes with extensible topping-lift booms, and for the vertical elevating mechanism on which can be mounted shovels, crane arms, rams, stacking tables, and devices for stacking both cylindrical and rectangular packages. They are capable of handling 3,600, 4,800, and 6,000 lb. at high speed over ordinary street pavements or on cinder-filled yard areas.

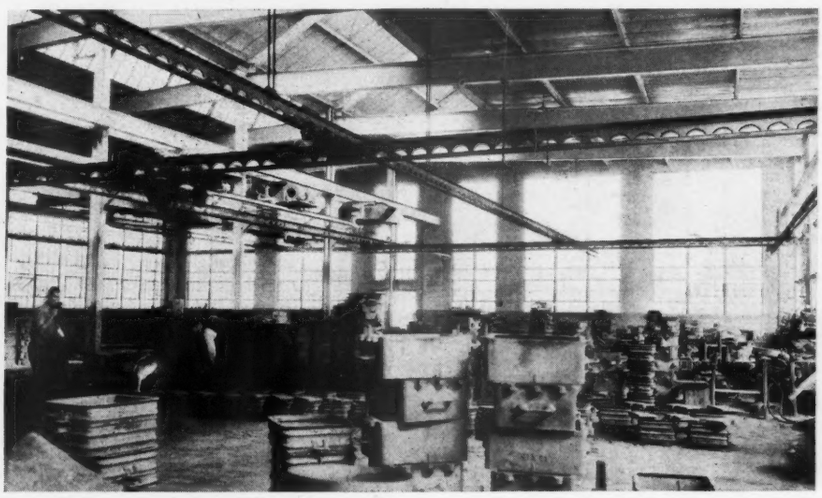
A truck has been developed known as the foot-lift truck. This truck enables the operator to elevate the load by using the full weight of his body, rather than calling into play his back and stomach muscles, which are used when the load is elevated with the steering handle. The foot pedal is so designed that it automatically



Low-platform, low-lift, electric truck, 6,000-lb. capacity, with 1,500-lb. capacity crane.



on the end of the hook, the wire is flipped off at the wire-drawing benches without rehandling.



Multi-runway crane. The divided span permits lightness and thus facilitates hand propulsion. Building construction may be lighter.

engages with the load-elevating means when depressed, and automatically disengages when it is returned to normal operating position.

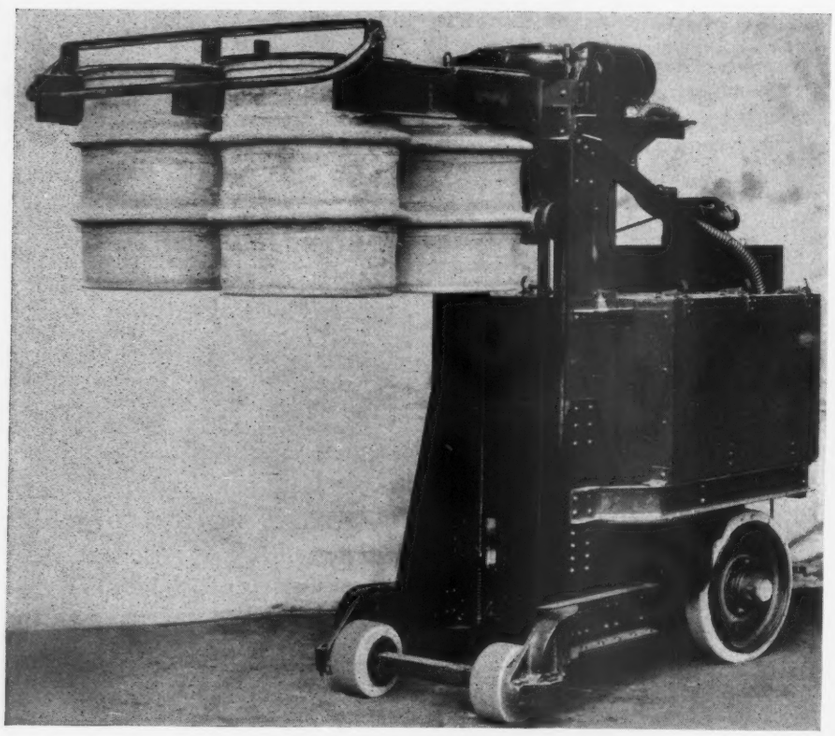
A rapid and extensive use of conveyor-type systems for electro-plating and deposition of metals has been reported. Estimates made by the manufacturers of this equipment indicate in many cases that the labor is cut 20 to 25 per cent, and at the same time the material is transported from one point in the plant to another for the next operation.

Another significant development in the metal-working field is the handling method adopted by the manufacturers of tinplate and sheet steel, who are loading this material into freight cars on standard skids by means of storage-battery industrial trucks so that the recipient of these goods at the other end of the line can unload them from the same skids with the same type of truck and effect a tremendous saving in the handling cost.

A manufacturer of automobiles has adapted the fork-type truck to select bodies of the correct color to fit the specification of the chassis on the assembly line. The method has reduced storage 66 per cent and has saved an investment of $250,000.

A materials-handling installation has been made at a motor-car company's plant in Detroit in connection with a new forge shop for crankshafts. The shop is laid out for straight-line, continuous production, with no stock of parts at any operation. Travel of the metal from the original bar stock, through all processes, and finally into the railroad car for shipment, is handled by various conveyor systems. There are five forging units, three heat-treating furnaces, and two pickling machines. This equipment handles 7,500 crankshafts a day. The time required to convert bar stock into crankshafts, delivered at the shipping platform, is only 4½ hours.

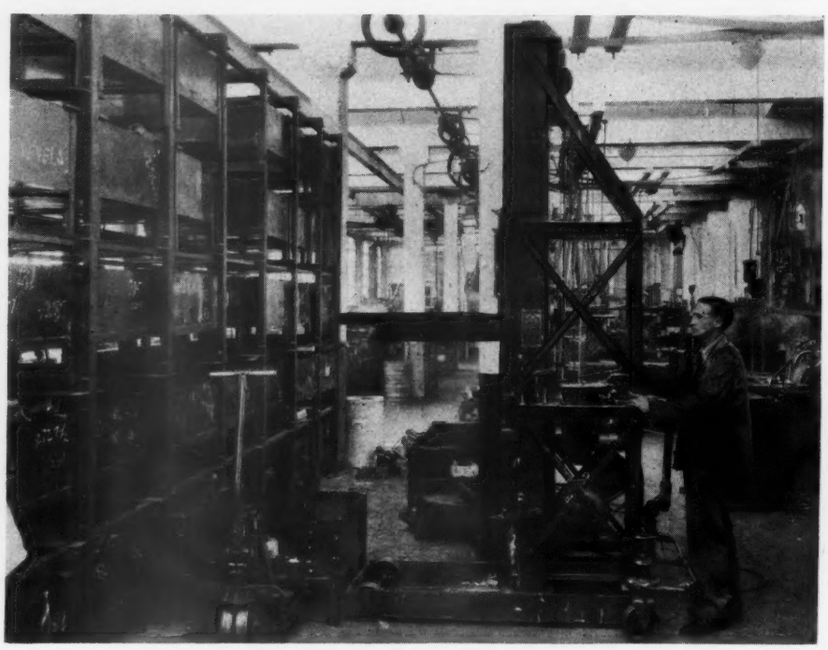
There has been placed into use an adaptation of an industrial-truck skid with a specially designed rack for handling assembled motor rotors. This method keeps the rotors clean and free from damage and allows bulk handling from and to storage.



Units weighing from 1,000 to 2,000 lb. are handled by this jack-lift truck. Standard box skids are used for handling material through processes.

Skid Shipment

The Department of Commerce reports that this method of shipment has continued to grow, as well as the use of various types of containers for rail and water shipping. In some cases skid shipment has shown a very remarkable saving, one large paper company reporting a reduction in labor costs of 90 per cent.



By this machine four drums, at three times the speed of a man with a hand truck, are handled. The drums are loaded into box cars and are taken out of cars and stored two high in the warehouse.

The Cover Picture

shows the plant of the National Cash Register Company, Dayton, Ohio. There are 23 buildings containing 53 acres of floor space. Approximately 2,300 ft. of service tunnel connect the buildings. Extent of the plant engineering activities is indicated by the following data:

There are 7,655 employees; 1,800 motors, totaling 13,512 hp.; 4,800 machines in the mechanical equipment; 3 miles of railroad track and siding; 350 telephones; 305 miles of electric wiring; 22,600 electric lamps; 37 elevators; 8 miles of conveyors; 350 miles of pipe; 76 miles of belting; 54,000 ft. of line shafting; 265 shower baths; and 320 drinking fountains.

Handling the function of plant engineering is the Power and Maintenance Department, under the direction of the Maintenance Engineer. This department is made up of seven sub-departments: Construction; electrical; plumbing and millwrighting; power house; plant inspection; outside and landscape; and factory layout. Personnel of these sub-departments varies from 350 to 470. The power and maintenance department is a part of the "Making," or manufacturing division, and reports to the plant superintendent.

For detailed description of the plant engineering setup and allocation of duties see *Industrial Engineering*, September, 1929.

American Institute of Electrical Engineers Winter Convention

TECHNICAL papers to be delivered at the 1930 winter convention of the A. I. E. E., which will be held in New York City, January 27-31, cover the subjects of protective devices, power system planning, field investigating of lightning, transoceanic telephony and telegraphy, dielectrics, welding, and electrical machinery.

Other features include inspection trips, lectures, and the Edison Medal presentation.

National Standard Safety Code for Building Exits

A NATIONAL standard safety code for building exits aimed to cut down the annual loss of 15,000 lives by fire in the United States, has just been approved by the American Standards Association and made available for adoption by state and municipal authorities and for use by architects, engineers and builders. The code was prepared by a technical committee of thirty representatives of safety and insurance organizations, federal government departments, state departments of labor, local fire departments, architects, engineers and others. It represents sixteen years of study by this committee and its predecessors.

The National Fire Protection Association assumed the technical leadership in the preparation of the code under the national standardization procedure of the American Standards Association. The code contains an entire new section on theatres and other places of public assembly, and a revision and enlargement of a tentative code issued in 1927, covering safe exit provisions for schools, hospitals, department stores, factories and other occupancies.

Management Congress, Equipment Exposition for Chicago in March

FIVE classifications will cover the various sections of the Industrial Equipment Exposition to be held in Chicago at the Stevens Hotel, March 3-7, 1930. They are:

Power transmission
Materials handling equipment
Plant construction materials
Factory operation requisites
Management production control

To be held at the same time, the National Management Congress will provide eight sessions, the central theme of which is to be "Organization for Permanent Prosperity." In the Congress four societies are cooperating: American Society of Mechanical Engineers, Society of Industrial Engineers, American Management Association, and National Association of Cost Accountants. Plant maintenance is to be the topic of one of the sessions.

An evening session of the congress will be devoted to the opening of the 1930 Elimination of Waste in Industry drive. A number of papers describing campaigns against waste in specific plants will be presented and discussed.

At the exposition there will be a special booth given over to exhibitions of prize waste-elimination boards of companies that have conducted campaigns.

BOOKS

Electricity—What It Is and How It Acts

By Andrew W. Kramer, Published by Technical Publishing Company, 53 W. Jackson Boulevard, Chicago, Ill. First edition, cloth, 274 pages, 5½ x 7¾ in., illustrated. Price $2.

ALTHOUGH this book is not an elementary study of electrical engineering it is a work which deals with the fundamental principles that underlie the laws upon which electrical engineering is based.

It is not concerned with the solution of practical electrical problems nor does it attempt to deal with the constructional features of electrical equipment.

There are discussed in this volume only those phenomena which are not concerned directly with the electromagnetic radiation of energy. In 35 chapters are covered certain historical considerations relating to the first suggestion of the atomic nature of electricity; other fundamental conceptions regarding the electron, its properties and size, and arrangements in atoms and other various elements. Theories pertaining to the condenser, the solenoid, and the electric arc. Principles of thermionic emission, and further considerations with regard to two- and three-electrode vacuum tubes.

Radiation phenomena, radio-activity, the electron theory of magnetism and related subjects will receive treatment in a second volume.

Materials Handling Equipment

By Edward J. Tournier, Estimating Engineer, Robbins Conveying Belt Company, New York, N. Y. Published by McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Cloth binding, 6x9 in., 409 pages, 326 illustrations. Price $4.

IT is the purpose of this book to set forth the results, in service, of those mechanical handling devices which are most frequently used, to show how these forms are adapted to different uses, to indicate the methods by which a proper selection may be effected, and to serve as a guide to the most economical methods of purchasing.

This book aims, also, to show how certain formulas may be used to determine, in advance, the possible gains from the installation of materials handling equipment.

It represents a complete survey of the use of mechanical handling devices.

INDUSTRIAL ENGINEERING

Plant Engineering in Industry

L. C. MORROW, *Editor*

Chicago, January, 1930

Volume Eighty-Eight

THIS issue begins Volume 88 of INDUSTRIAL ENGINEERING, a consolidation of several publications. The genealogy is as follows:

Electrical Review, begun in 1882 as the *Review of the Telephone and Telegraph,* with George Worthington as editor, was the founder paper. It absorbed *Western Electrician* in 1908, *Electrocraft* in 1912, and *Electrical Engineering* in 1928.

The McGraw-Hill Publishing Company purchased *Electrical Review* in 1922 and changed the name, first to *Electrical Review and Industrial Engineer,* and then to *Industrial Engineering.* D. H. Braymer became editor in 1922 and was succeeded in 1926 by G. A. Van Brunt, now electrical editor. In December, 1927, *Industry Illustrated* was consolidated with *Industrial Engineering.* The present editor took charge in November, 1928.

The staff of *Industrial Engineering* consists of: L. C. Morrow, editor; Wilbur A. Beck, managing editor; G. A. Van Brunt, electrical editor; E. P. Sweeney, assistant editor; and William Staniar, consulting editor.

Industry Takes Up the Matter of Pensions

INDUSTRY is considering seriously the matter of old age pensions for employees. The economic value of pensions is rather generally conceded. It remains to settle upon a few workable systems that will not be paternalistic, will not impose heavy burdens of economy upon the beneficiaries, and yet will protect them in case of company failure.

An example of a large industrial unit arranging for old age pensions is the Westinghouse Electric and Manufacturing Company. The coverage of the plan adopted by this company, reckoned after the manner of group insurance coverages, will be approximately $54,000,000 at the start and $14,500,000 annually thereafter.

Under the plan the company's part of the cost is to be paid as a regular operating expense. Every employee will benefit, and he may buy additional retirement income if he wishes. Estimated net annual cost to the company is 1.2 per cent of the payroll. The employee is certain of receiving the income, because cash for the purpose is turned over annually to the board of trustees administering the fund.

Except for the small group of people who enjoy saving for saving's sake, almost every individual could enjoy more of the world's offerings if he knew that he could depend upon a definite income irrespective of his efforts, when he is no longer able to work regularly.

It seems, therefore, that in adopting the right kind of old age pensions industry is contributing toward the expansion of buying power, obviously a necessity in this era of great production, and equally great consumption.

During the Next Three Months Your Maintenance Work Will Be All Important

OUTSTANDING last month was President Hoover's conference with business leaders at the U. S. Chamber of Commerce meeting. The conference was unique in the history of business, the nation, and probably the world.

There was evidenced a sincere desire on the part of all groups to cooperate in the President's program for meeting such emergency as may exist in the form of actual or threatened unemployment.

Belief that business is fundamentally sound was borne out by statements of the representatives of a large number of industries to the effect that they expect, at the worst, only temporary recession of business.

Railroads plan for 1930 an increase of 40 per cent over 1929 in expenditures for equipment, roadways, and structures. Public utilities expect to spend about 8 per cent more for new construction. The iron and steel industry expects a good average year. Automotive industries expect normal output (5,000,000 units). Textiles look forward toward holding existing levels. In the chemical industries an increase of 1 per cent in value of products is predicted. Highway construction, output of rubber products, production of petroleum products, meat packing, and paper and pulp making are expected to maintain approximately the 1929 levels.

These forecasts have a significance of direct value to the plant men of industry. They are indicative of the existing optimism of business—its willingness to go ahead. They indicate plant expansion where justifiable, and modernization as the rule. They imply keener competition, for which plants must be prepared.

In his message to the U. S. Chamber of Commerce the President himself provided the analysis of the part that plant engineering is to play in 1930 industrial history, when he said, "The great-

est tool which our economic system affords for the establishment of stability is the construction and maintenance work, the improvement and betterment, and general clean-up of plants in preparation for cheaper production and the increased demand of the future."

The best time to do this work is during the next three months, before the large public and private construction programs promised for the year have gotten into full swing, with consequent enlarged demand for labor and materials. During these three months a very considerable part of the money budgeted for 1930 maintenance should be spent, in the interest of ultimate economies and lowered production costs.

Exports Indicate Wider Acceptance for Mechanical Ventilation and Air Conditioning

RECENT export reports from fan manufacturers show that air conditioning, ventilating, and related equipment for industrial use is being shipped to practically every corner of the world.

What is it all used for? Drying eggs in China. In textile plants in India. In packing plants in Brazil and the Argentine. A bank in Japan. And for recovering lint from cotton seed in Russia.

Our interest in these statements lies in knowing that the other side of the world is recognizing the necessity for air conditioning and ventilating in industrial plants. With only one reference to other than industrial use (the bank in Japan) it appears that there, as here, the adoption of such equipment is the result of its imperative need to make processes successful.

Later, with them, as with us, will come a realization of the advantages of conditioned air and planned ventilation because of their effect upon quality and output as a result of providing better conditions for the people making the products.

Index to 1929 *Volume of Industrial Engineering Is Ready*

UPON application to the Circulation Department, 520 North Michigan Ave., Chicago, you may have a copy of the index to the contents of the 1929 volume of INDUSTRIAL ENGINEERING. The index is arranged to show the articles under "subject" headings and contains cross references wherever they will be of assistance. There is also an authors' section, wherein the titles of articles are listed under authors' names arranged alphabetically.

The New Cover

WE hope you like the editorial cover, introduced with this issue. In adopting plant exteriors as the subject matter for the covers, the editors had in mind the objective of furnishing decorative covers that will be useful.

Each plant shown will be selected because of features of building construction or layout, or because of features in the execution of the function of plant engineering. A short description of the organization for plant engineering, together with information indicating the scope of the function, will be given in the editorial section.

We Suggest Rewards for Suggestions

THE giving of rewards for suggestions almost always is a paying investment. There is every chance that the men intimately connected with the details of plant operation will think of money-saving methods and devices. If there is a definite channel by which their suggestions can get to the executives responsible for passing on them, and if rewards are paid for suggestions adopted, thinking is stimulated, and good ideas result.

Suggestion boxes are conspicuously located in some plants; in others the suggestions are handed to the foremen; another system provides that they be given to a member of a suggestion committee. Any one of several methods of keeping the men keyed up to make suggestions can be used.

Rewards must not be niggardly; when they are, it is a real case of being penny-wise, pound-foolish. It is simply human nature that people, by and large, will not pass on good ideas when they get little or nothing for them. One method of determining the amount of the award is to make it proportional to the savings over a given time. Another is to give a flat sum which, in the opinion of the reward committee, is a fair percentage of the savings that will accrue. In some plants no cash awards are made, but promotions are based upon the success of the individual's suggestions.

Production departments have been making use of the reward policy for a long time. Plant engineering departments have been relatively slow in its adoption. Yet there is great opportunity for valuable suggestions concerning the engineering within the plant.

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Industrial Engineering's
EQUIPMENT REVIEW

REVIEWED in the following pages are all of the items of equipment that were described in the New Equipment section of *Industrial Engineering* in the twelve issues of 1929. This issue, therefore, furnishes, under one cover, an equipment index and guide of permanent value.

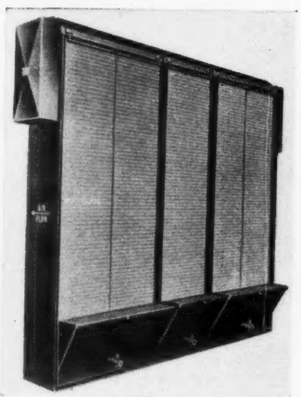
Announcements of equipment as it is placed on the market are made each month as a service to the reader. In this service *Industrial Engineering* thoroughly believes. The editors aim to make the service complete by announcing every piece of equipment within the field of "service to production" as it is made available for purchase, and invite the co-operation of manufacturer and distributor in making available promptly suitable technical descriptions and photographs.

Air Conditioning Equipment

Air Filter, Multi-Panel

Reed Air Filter Co., Louisville, Ky.

Viscous-type air filter consisting of a multiplicity of overlapping double-screen panels that form a continuous movable curtain. The panels, which are suspended from horizontal rods carried by two endless chains, overlap each other like shingles



on a roof forming a filtering curtain with a depth of five panels. The average resistance through the filter is 0.36 in. water gage. These panels are corrugated horizontally to secure the desired spacing between successive layers; to supply additional voids for dust accumulation, and to provide increased filtering area.

When operated by a solenoid and ratchet mechanism, or by a hydraulic drive the filter curtain moves ¾ in. every 12 min., however, under severe dust conditions the speed may be increased to maintain a normal operating resistance.

As the panels reach the lower turn they automatically separate and are cleaned, one at a time, by swinging in the oil. Each panel drains for a period of 1½ hr. after leaving the oil and before it enters the air stream thereby eliminating the possibility of entraining oil.

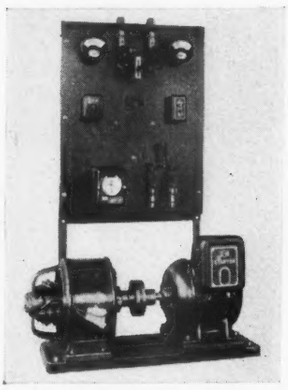
These filters are made in capacities ranging from 3,000 to 84,000 cu. ft. per minute. A filter of similar construction, but with additional reinforcing to withstand a pulsating air flow is also made in capacities ranging from 1,500 to 24,000 cu. ft. per minute.

Battery Chargers and Accessories

Battery Chargers

Engberg's Electric and Mechanical Works, St. Joseph, Mich.

Designed for manually or automatically charging one or more lead or Edison batteries. Each unit consists of a switchboard, and a four-bearing, motor-generator set mounted on a common base, the motor and generator being direct connected by an insulated flexible coupling. The generator is furnished to suit the speed requirements of each battery installation. The motor can be furnished in either a.c. or d.c. styles. All switchboard instruments are permanently connected in the circuit.

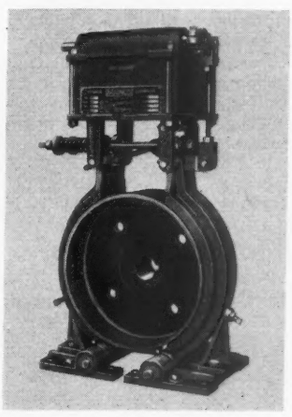


Brakes

Brake, A.C. Elevator

Maintenance Co., 449-53 W. 42nd St., New York, N. Y.

In this a.c. elevator brake all the operating mechanism is at the top supported by the shoes so that no separate base or mounting is required. It is so designed that the magnet and armature hang naturally in the oil from which they may be removed as a unit with the top, without disturbing the reservoir.

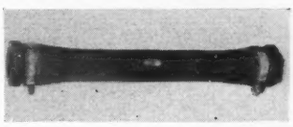


Compressors Pumps and Accessories

Pump Vibration Arrestor

Chicago Pump Co., 2336 Wolfram St., Chicago.

This device, designated as the "Vib-Restor" is a special rubber hose complete with couplings, which takes the place of the metal piping between the intake and the pump, and the pump and the outlet. Its function is to absorb vibration.



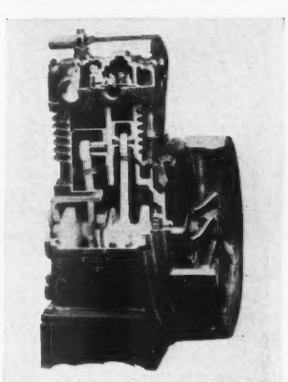
Compressors, Air

Curtis Pneumatic Machinery Co., St. Louis, Mo.

Three general classes of compressors make up the complete "75th Anniversary" line, namely: the single-cylinder, single-stage; the two-cylinder, single-stage, known as the duplex; and the two-stage. This line includes eleven models of various types and sizes ranging from ¼ to 5 hp., and from 150- to 200-lb. pressure.

Where the service is intermittent, and the pressures do not exceed 150 lb., the single stage, either single cylinder or duplex, is recommended. It may be furnished either air or water cooled. The two-stage type is designed to work against pressures ranging from 175 to 200 lb., where service is either intermittent or continuous. All compressors of this type are air cooled.

Compressors of all types are equipped with Timken tapered

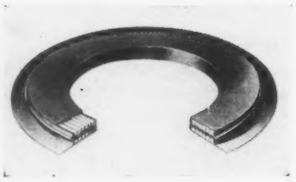


roller bearings. They are designed for either automatic or manual starting, and are equipped with either automatic air pressure or manually-operated, unloading devices.

Gasket, Armor-Clad

Flexitallic Gasket Co., Camden, N. J.

This gasket, designated as the armor-clad "Flexitallic," will take care of the most severe service conditions such as high



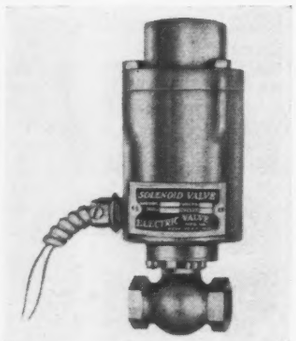
pressure, high temperature, and even acid conditions.

A special feature is the web which extends out to any width desired depending upon the inside diameter of the bolt circle. The armor is made of thin sheet aluminum. The accompanying illustration shows the details of construction.

Solenoid Valves, Packless-Type

Electric Valve Manufacturing Co., 68 Murray St., New York, N. Y.

These solenoid valves were designed to control the flow of oil, water, brine, gas, air, etc. All solenoid movements are of the same design but in order to provide ample power to operate them a selection of models is offered with each valve. Type N, which is of a needle type, is furnished in two styles, Models 50 and 75. Four styles,



Models 50, 75, 100 and 125 are offered with the Type D which is a globe valve with removable disks. To meet the various working conditions a choice of disks made of several different compositions is offered.

Type S B is a double disk semi-balanced valve for moderately high pressures. Models 75, 100 and 125 are suggested for the operation of this type.

All valves are of the packless type. The solenoids can be used with any two-wire control such as thermostat, push-button, pressure regulator or float switch. They are furnished for either a.c. or d.c. 250- or 440-volt service.

Gate Valves, "King-Clip"

Lunkenheimer Co., Cincinnati, Ohio.

Designed for use on steam, oil, gas, air, water and gasoline lines, and made in three types: Rising-stem inside screw; out-

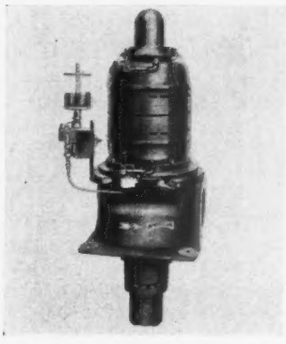
side screw and yoke, and quick-operating. They are procurable in iron-body, bronze-mounted, and all-iron patterns with screw or flanged ends.

Pressure ratings of these "King-Clip" gate valves are as follows: Screw ends ¼ to 2 in. inclusive, 150 lb. working steam pressure, 225 lb. gas or liquid pressure; screw ends 2½ to 4 in. inclusive and flange ends 1½ to 4 in. inclusive, 125 lb. working steam pressure, 175 lb. gas or liquid pressure.

Pumps, Deep-Well Turbine

The American Well Works, Aurora, Ill.

The turbine head of these 6- and 8-in. deep-well turbines

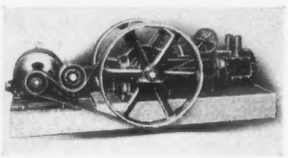


consists of a vertical motor, the thrust bearing of which is designed to carry the load of the line shaft and impellers. To the turbine head is attached the supporting pipe, to the lower end of which is attached the turbine proper, which is made up of the number of stages necessary for the specific requirements. All bearings are oil lubricated by electrically-controlled gravity feed from the surface.

Compressors, Straight-Line

Worthington Pump and Machinery Corporation, Harrison, N. J.

Feather valves are standard equipment on this line of single, horizontal, straight-line compressors which range in capacities from 100 to 300 cu. ft. per min. Timken bearings are employed on the main crankshaft journals which are inclosed in an oil-tight crankcase. Oil rings, which are mounted



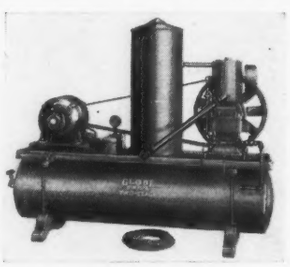
on the shaft beyond the bearings, deflect the surplus oil and return it to the crankcase. Regulation may be effected by means of an automatic starter and pressure switch acting on the motor or a pressure regulator acting on the inlet valve.

These compressors can be furnished with ball-bearing idlers for short-belt drive, with Texrope drives, or with a synchronous motor direct connected to the crankshaft.

Compressor Unit, Air

Globe Manufacturing Co., Battle Creek, Mich.

Known as the Simplex Type W, Two-Stage, Water-Cooled Victory Unit, this compressor



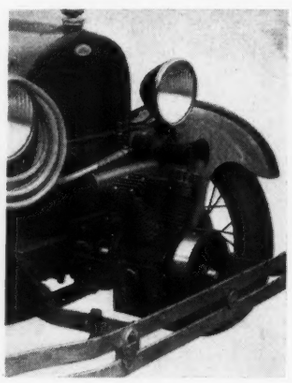
has a cooling system designed for operation with running water where continuous pumping is required, or with thermo-siphon circulation for intermittent duty.

A complete unit consists of a vertical air compressor, a motor, an automatic starter, a 30-gal. water-cooling tank and an automatic controller with pressure unloader mounted on a steel, air-storage tank, and minor equipment.

Compressor, Portable

Globe Manufacturing Co., Battle Creek, Mich.

Among the uses suggested for this two-cylinder air compressor, which can be mounted on



the end of an automobile or tractor, are paint spraying for all classes of outdoor work, the operation of pneumatic tools and other jobs requiring the use of compressed air in the field. The compressor is driven from the engine in the car or tractor and it is equipped with Timken bearings lubricated by means of positive oil rings. Standard equipment includes 25 ft. of air hose with chuck, safety valve, and gage.

Packings for Acids, Alkalies and Petroleum Products

Green, Tweed & Co., 105 Duane St., New York, N. Y.

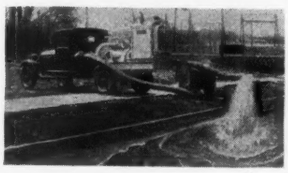
Three kinds of packings, designated "Cutno," "Pelro" and "Palco," are made by the above company in sizes from ⅛ to 2 in., and in twists from 1/16 to ½ in. Each form of packing is impregnated with a lubricant which resists the washing-out tendency of the fluid pumped.

Cutno packing is especially designed for use in pumps handling chemicals. Pelro is suitable for use with gasoline, naptha, alcohol and similar liquids. The Palco line is intended for hydraulic pressures with hot or cold water and calcium brine.

Pumping Unit, Portable

Fairbanks, Morse & Co., Chicago, Ill.

Designed for the economical handling of fluids containing large solids and much foreign matter, particularly material of fibrous or stringy character such as is found in sewage.



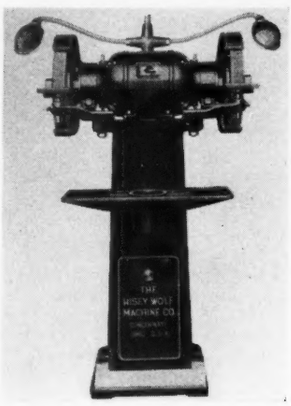
Anything that will enter the suction nozzle through a right-angle bend will pass the impeller, the pump being designed to handle solid spheres as large in diameter as the pipe size next smaller than the suction connections. The units are mounted on a platform as illustrated, on skids, or on a trailer truck to meet different requirements.

Control Equipment

Grinder Treadle Switch

The Hisey-Wolf Co., Cincinnati, Ohio.

For the purpose of saving power by insuring that grinders will not be allowed to run when not in use the above company developed the foot treadle

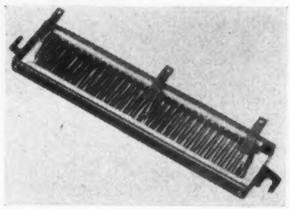


switch shown in the illustration. It is available on all Hisey motor-driven grinder and buffing machines. To use the grinder the operator must push the treadle down with his foot and keep it there. When the foot is removed the grinder stops.

Controller Resistance Unit, Edgerest

Industrial Controller Co., Milwaukee, Wis.

Known as the "Edgerest," this resistance unit consists of nichrome ribbon shaped into the form of a zigzag. The end of each convolution is held in recesses in the porcelain section. The porcelain unit is sectional and slips into scored channels. Any number of these units may be mounted one above the other by means of a slip-on clamp which snugly fits a rod. The rod also

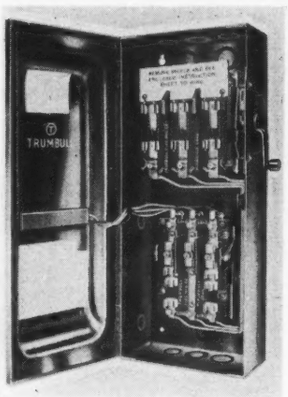


accommodates spacers between the units. The terminal clamps may be attached to the ribbon at any point.

Switches, Combined Inclosed

Trumbull Electric Manufacturing Co., Plainville, Conn.

These switches represent an addition to the magnetic switch line. The "R. M." switch is



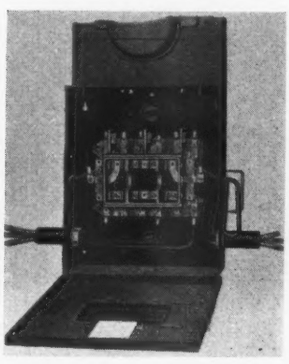
combined with a magnetic switch in the same cabinet.

Four separate group combinations are made for one size of box.

Polyphase Switches

Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn.

The Noark Quadbreak polyphase switches for two- and three-phase circuits are made in two types—meter service



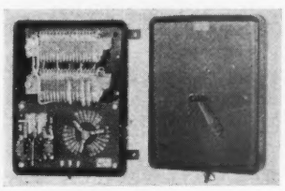
switch which has full meter-testing facilities, and main entrance type in which these features are omitted. Freeing of meter terminals for testing purposes is accomplished by means of the switch breaks themselves.

Controller, CR-7765-B-1

General Electric Co., Schenectady, N. Y.

This device, bearing the designation CR-7765-B-1, has the primary magnetic switch, dial-type controller, and speed-regulator resistance mounted in a sheet steel case.

Each controller consists of a line contactor, a temperature

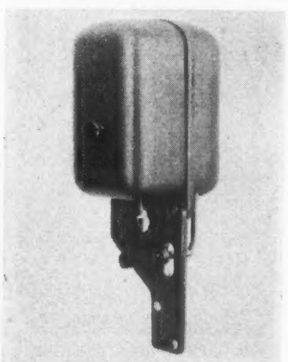


overload relay, a secondary dial switch operated from outside of the cover, a resistor and a start-stop push-button station. Overload and under voltage protection is provided. The pushbutton extends through the right side. Speed regulation is obtained by moving the dial switch arm on the front of the case.

Devices, Under-Voltage

General Electric Co., Schenectady, N. Y.

These two under-voltage devices bearing the designation MG-2 and TF-2 were designed



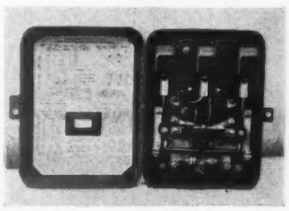
to trip the breaker in the circuit only after a suitable time interval has elapsed.

The MG-2 device operates in conjunction with suitable motor-operated mechanisms. It has an electrically interlocked switch which prevents the power being turned on unless the protective unit is in operative condition. The TF-2 under-voltage device is of the solenoid and plunger type with an air bellows for time delay. The time can be varied from approximately one second to one minute.

Switch, Combined Magnetic

Diamond Electrical Manufacturing Co., Los Angeles, Calif.

Among the features which distinguish this KXR line of switches are: Panel and arc



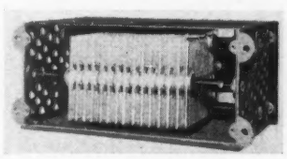
shields as well as the starting lever are made of Bakelite, the latter set integral with the panel; two- or three-wire remote control is provided in addition to thermal overload relay and low-voltage release devices.

A further improvement in this line is a combined manual and automatic across-the-line starting switch particularly designed for refrigeration service.

Rheostat, Cast-Grid

Columbia Electric Manufacturing Co., 1292 East 53rd St., Cleveland, Ohio.

A panel-mounted, cast-grid resistor built to withstand acid fumes in plating work. The cast-grid rheostat is of the



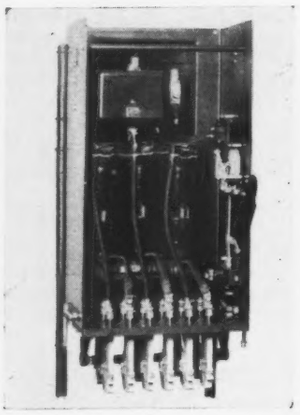
parallel-resistance type to afford regulation of the voltage and current according to the generator voltage and character of the plating.

The rheostat unit includes a volt-meter, an ammeter, and six switches mounted on an asbestos board panel. These units are regularly manufactured with switches to give steps of about 2½ per cent of full current capacity.

Compensator, Manual

General Electric Co., Schenectady, N. Y.

A manual starting compensator, CR-1034-K-33, that is especially applicable to the control of high-speed, squirrel-cage motors including all two- and most four-pole motors, particu-



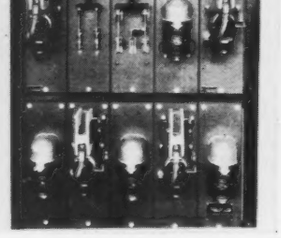
larly those driving loads of relatively high inertia.

Special features include: A switch design providing wide break and high interrupting capacity; time-delay, under-voltage release; contact tips of standard contactor construction and action; cabinet construction with ample room for ready connections and access to all parts.

Control, Time-Current

Electric Controller and Manufacturing Co., 2700 East 79th St., Cleveland, Ohio.

A system of control developed with the use of an acceleration relay that is especially suitable for steel mill application such



as for screwdowns, mill tables and other drives. The relay has only one moving part, an aluminum sleeve carrying the contact bar. Contactor sizes No. 1 and No. 2 have case-hardened steel bushings in the main arm. Ball bearings are used on the larger sizes of contactors. Operating coils are designed for continuous operation on standard voltages, 250 or less.

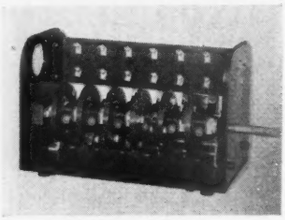
Switches, Cam-Operated Master, and Limit

General Electric Co., Schenectady, N. Y.

In this line of cam-operated, double-break master, and limit switches, the former bears designation LS-429, the latter C-3614 and C-3616. They are designed to be used where geared-type switches are required.

Adjustment of the limit switch is made by shifting, tripping, and closing dogs on the cam. The contact mechanism is of the snap-action type and is latched in both the open and closed positions.

Master switches are made in three forms: A one-point

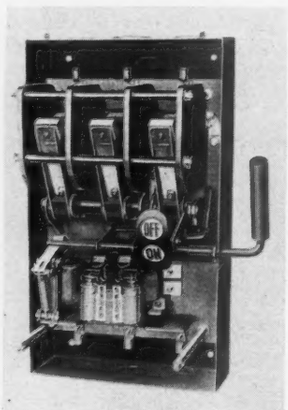


switch bears the designation 3614-AA; a three-point switch is designated C-3614-BA; and a four-point switch known as C-3616-AA. All contact tips are renewable and common to all devices in the line.

Circuit Breaker, Inclosed Air-break

Roller-Smith Co., 233 Broadway, New York, N. Y.

Type EAF designates a line of small, inclosed, air-break, circuit breakers. These breakers are offered for the protection of motors and feeder circuits



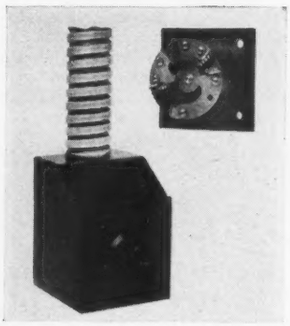
against overload and voltage failure.

They are made in capacities of ½ to 80 amp., 250 volts d.c. and 550 volts a.c., in two- and three-pole designs.

Pushbutton, Safety

Lincoln Electric Co., Cleveland, Ohio.

This unit is a departure from the usual construction in that the ball-top start button is contained inside a large projecting stop button that protects the



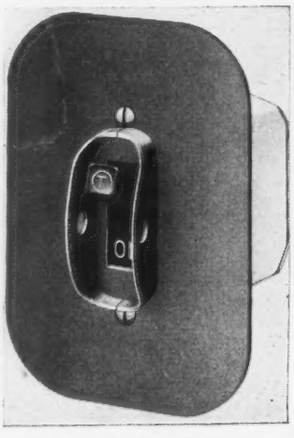
start button from accidental contact. The start button can be operated only by the tip of a thumb or finger inserted inside the stop button. The stop button can be operated by a finger or palm of the hand. The inner mechanism is inclosed in an arc-welded steel box 2½ x 3¼ x 2½ in. in size. All insulating parts are of molded Bakelite.

Switch, Thermostatic Tumbler

Trumbull Electric Manufacturing Co., Plainville, Conn.

A small, single-pole switch designed to control fractional horsepower motors, and made

in three models: The Surface Type, with box dimensions 2 11/16 x 4 1/16 x 3 in., whose operation is similar to that of

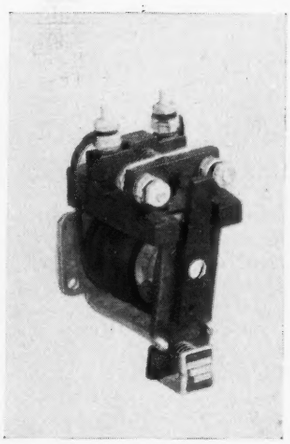


the No-Fuse switch; the Flush Type which fits any standard wall box except the shallow type; and the switch only, which may be mounted in any standard wall box except the shallow type and with which may be used any standard tumbler switch plate. The operating characteristics are similar to those of thermal overload relays or thermal plugs.

Relay

General Electric Co., Schenectady, N. Y.

This relay, for use on various types of alarm circuits, and bearing the designation CR-

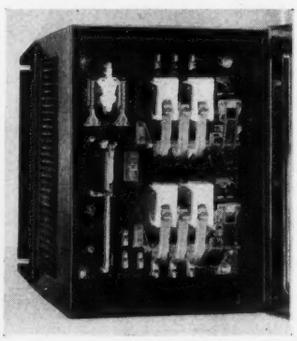


2810-1245, is of the normally-closed type and functions to actuate a warning signal on the failure of power.

Starter, A.C. Automatic

Monitor Controller Co., Baltimore, Md.

Except for the thermal timing relay which controls the operation of the accelerating contactors, this starter is a normal Monitor resistance-type starter



provided with overload, inverse-time-element relay and low-voltage protection.

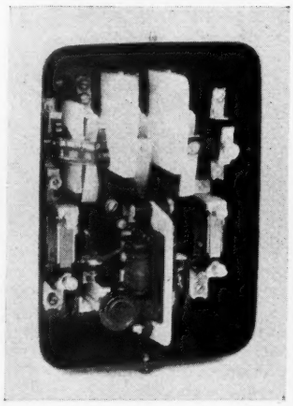
A pivoted walking beam equipped with an arm extending at right angles and which carries a contact that opens and closes as the beam tips one way or the other, is kept in position by two equal and

similar wires held taut by a spring. The position of the beam is determined by the relative lengths of the wires, which are affected alike by changes in room temperature.

Switches, Magnetic

General Electric Co., Schenectady, New York.

Type CR-7006-D-26-A is a three- and four-pole magnetic switch with self-contained "Start" and "Stop" stations



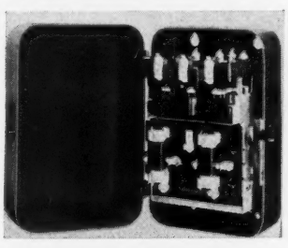
having features for overload and low-voltage protection. It is used for starting and protecting small a.c. motors, and consists of a triple-pole, barrier-type contactor, and a double-coil, temperature-overload relay, all mounted on a molded case.

Switch designated CR-7006-D-26-D, although for the same general class of application, is for use with remote push-button stations. The switch mechanism is located below the center of the box to prevent interference with the mounting holes.

Starter, Type A-30, "Cross-the-Line"

Condit Electric Manufacturing Corporation, Boston, Mass.

This "cross-the-line" motor starter, known as the Type A-30, for use with squirrel-cage induction motors up to 20 hp. at 550 or 440 volts, 15 hp. at 220 volts, and 7½ hp. at 110 volts operates to prevent an arc forming, thereby eliminating the formation of gas and permitting relatively no contact burning on normal op-



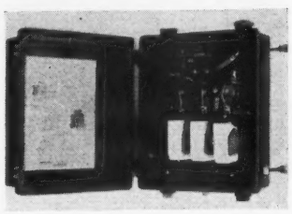
eration. It is furnished with thermal relays for time-lag overload protection, as well as for undervoltage protection.

Contactor for Linestarters, "Deion"

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Applied to Class 11-200 linestarters the "Deion" contactor confines, divides and smothers the arc quickly without the usual flash and attendant scattering of flame. Not only does it provide for a greater degree of safety to the operator, but it also permits a smaller enclosure and consequent decrease in the over all size of the starter.

During operation the arc resulting from opening the circuit is blown by a magnetic field into the deionizing cham-



ber, where it is broken up into many short arcs which are magnetically rotated to extinction. Complete deionization occurs as the line current passes through zero and the circuit is broken.

Switch, Oil-Immersed, Across-the-Line

General Electric Co., Schenectady, N. Y.

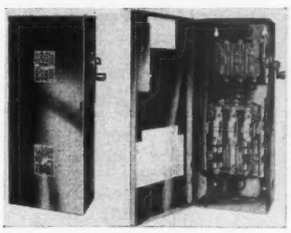
Code number CR-2960-SY-105 designates a small oil-immersed switch for starting small a.c. or d.c. motors. The molded switch base, which is bolted to the cover, carries the stationary contact stud parts, the moving contact assembly is mounted on another one-piece molded part. The contacts are of the silver-to-silver, double-break type eliminating shunts or drum type contacts.

Two holes in the cover in which the conduitbox is cast provide the means for mounting. The tank is secured to the cover by means of swing bolts and wing nuts. A felt-lined groove in the cover insures a tight fit.

Switches, Magnetic

Trumbull Electric Manufacturing Co., Plainville, Conn.

In this device a magnetic switch is combined with a 30-amp., No-fuse "R. M." disconnect switch providing either local or remote control. The contacts of the magnetic

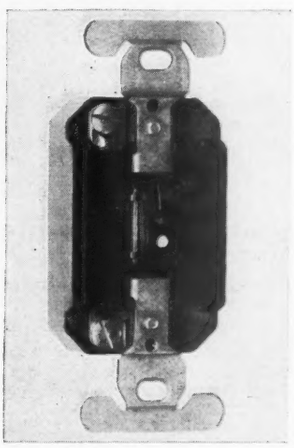


switches are double-break construction, and have no moving parts to interfere with the running of wires. The No-Fuse, "R. M." switch is of compact design with double-break blade construction and high interrupting capacity.

Switches, Covered Shallow-Type

Merchandise Department, General Electric Co., Bridgeport, Conn.

Especially designed to prevent the entry of dust and dirt into the mechanism these totally in-

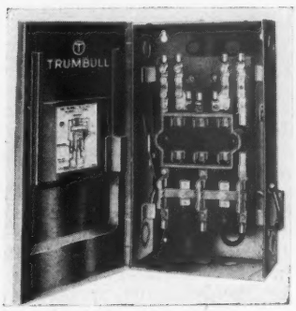


closed units use standard flush-switch mechanisms, and fit standard outlet boxes for flush mounting. They are rated 5 amp., 250 volts and 10 amp., 125 volts.

Switch, Polyphase

Trumbull Electric Manufacturing Co., Plainville, Conn.

This polyphase switch using an improved blade construction which provides a double break, materially increases the current



interrupting capacity and decreases the size of the slate and box. Blades are operated from the back of the slate. Line terminals are at the bottom and all connections are at the front and straight through to the meter. Meter testing facilities are provided above the switch. The Meter Testing Type is provided with removable test links which together with fuses and blades, are mounted on the top of a single slate.

This design is furnished for 30- to 200-amp., 230-volt a.c. service.

Tumbler Switch, Surface-Type

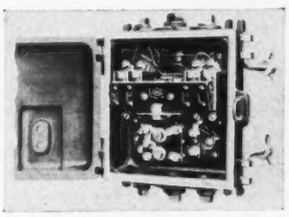
General Electric Co., Schenectady, N. Y.

A redesigned switch which makes possible the use of the same parts for both surface and flush types. The same base is used for single-pole, double-pole, and three-way switches. They are adaptable for controlling small machine motors, and general 5-amp. 250-volt, or 10-amp. 125-volt installations.

Dust-Tight Inclosures for Starters

Cutler-Hammer, Inc., 150—12th St., Milwaukee, Wis.

For motors up to 5 hp. the inclosure is of cast-iron, and for larger sizes it is made of heavy-welded boiler plate. Eye bolts with wing nuts at the sides hold the cover tight to the case. A soft Pararubber gasket at this point providing a dust-tight and weather-proof



condition. The start, stop, and reset buttons are mounted directly in the cover of the small size inclosures. The larger sizes have the reset button only in the cover and a separate dust-tight pushbutton station provides remote control.

Starter, Across-the-Line, Safety

Lincoln Electric Co., Cleveland, Ohio.

A cover of the drop hinge type incloses the entire mechanism and permits the installation of these safety starters closely grouped. Standard equipment includes the safety pushbutton which provides an additional

safety factor in that the red stop button encircles and protects the green start button so that it is impossible to close the starting button unintentionally.

An instantaneous thermal and magnetic quench for the arc is obtained by means of the cadmium-plated steel shields. Contact life is assured by the wiping action which prevents pitting. Arc chimneys are of heavy-pressed magnesite which shield against currents in excess of the starter rating. The relay armature which is actuated by a coiled spring has a cushion action and it is provided with replaceable bronze bearings.

Compensators for Gaseous Atmospheres

General Electric Co., Schenectady, N. Y.

These hand-starting compensators, designated as CR-1034-N-52, are a modification of standard equipment so designed as to eliminate exposed arcing. The starting switch is oil-immersed and instead of a push-button tripping device, a standard time-relay undervoltage attachment and dashpot relays are used with a Cooper-Hewitt mercury switch substituted for the usual contact tips of the dashpot relays.

Compensators in this line are made for 25- to 60-cycle, two- or three-phase, 110-volt motors up to 15-hp. rating, and with 220-, 440-, and 550-volt motors up to 125-hp. rating.

Controller, Explosion-Tested Type

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

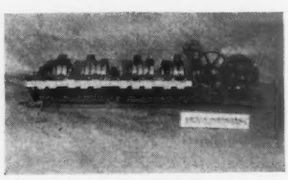
This drum-type controller which provides across-the-line starting for a small d.c. motor, is equipped with fuses mounted inside of the case to meet the requirements of the U. S. Bureau of Mines for explosion tested equipment. Accessibility is one of the features of this small controller, which is provided for by mounting the entire controller on the bottom base. The bottom base is

threaded to screw into a cylindrical case. Removing this case uncovers the entire controller for inspection or maintenance.

Controller, Automatic, Motor-Driven Drum

Reynolds Electric Co., Chicago, Ill.

For use wherever it is expedient to open or close electrical circuits by automatic means. This automatic, motor-driven



drum controller will make and break circuits as fast as 500 times per minute and as slow as once every 15 min., handling up to 50 amperes.

Switch, D.C. Cam

General Electric Co., Schenectady, N. Y.

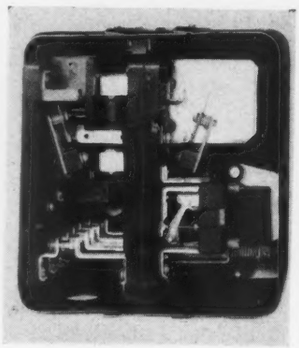
Designated CR-3108, this small d.c. cam switch is made in two forms for reversing service; one with armature regulation over five points, the other form with field regulation over 22 points.

Rated at 550 volts, maximum, the intermittent armature current capacity is 1,000 amp.; the continuous rating is 500 amp. This switch is suitable for non-reversing applications where the current inrush or starting torque is not severe or the operations are not frequent.

Control Switch for Circuit Breakers, Remote

General Electric Co., Schenectady, N. Y.

A control switch for the remote operation of circuit breakers. It is known as the



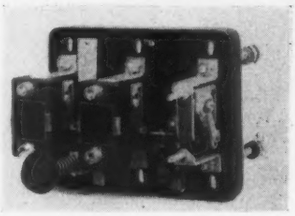
"Turn Pull" switch, because a combined turning and an in or out motion is required to operate it.

Main closing and tripping contacts are of the pivoted-shoe type, operated by the initial outward or inward motion of the switch shaft. The turning motion then operates four auxiliary, silver-tipped contacts through the action of cams. Two of the latter contacts are placed in series with the main contacts. Of the second pair of contacts; one is for an indicating lamp, the other for the alarm bell circuit.

Relays, Temperature Overload

General Electric Co., Schenectady, N. Y.

Two forms for either front or back connection cover the double- and triple-pole overload temperature relays in this line. Both are rated in capacities of from 30 to 150 amp. Relays bearing designation TC-121 provide for protection of two



legs of a circuit whereas the TC-131 relays provide an element for the protection of a third leg.

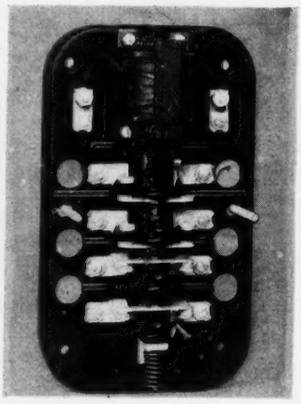
When used on inclosed panels air drafts are eliminated by the inclosing case, but on open panels it is necessary to use a cover over the relay.

Relay, Multi-Finger

General Electric Co., Schenectady, N. Y.

Where a number of independent a.c. circuits are to be remotely controlled this relay, designated as CR-2820-1080, may be used.

It consists of a series of



double-break, silver-faced fingers operating horizontally and controlled by a small solenoid. The power consumption of the solenoid coil is eight watts. Creepage and clearance for 550 volts have been provided. The contacts will carry 15 amp. continuously.

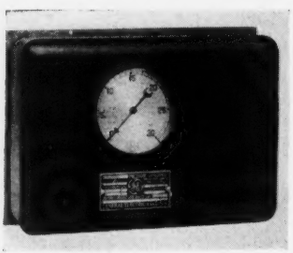
By varying the arrangement of the contact fingers, the relay may be arranged for different types of application.

Governor, Pressure

General Electric Co., Schenectady, N. Y.

To increase the reliability of the CR-2922 governor, the impulse-type relay has been replaced by a potential relay. The improved governor bears the designation, Form B-1.

On low pressure the relay is energized and remains so



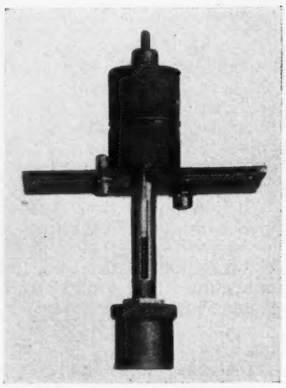
through a holding interlock until the relay coil is shorted out on high pressure through a series resistance.

On gages of 300-lb. rating and below Bourdon tubes are mounted two in parallel; one actuating the needle, and the other the contact mechanism. Provision is made for the incorporation of gages in sizes up to 10,000 pounds. The limit in the former design was 800 pounds.

Time Delay

General Electric, Co., Schenectady, N. Y.

A time delay device designed for use with manual operating levers on Types HA-2 and HC-2 switchboard-type oil circuit breakers. It can be used in place of a relay where a time delay, not necessarily exact or selective, is desired. It cannot be used with a breaker required to start a motor on full voltage.

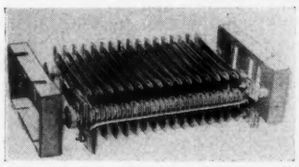


Resistor, "DUR-ristor" Unbreakable

Cutler-Hammer, Inc., Milwaukee, Wis.

All "DUR-ristor" type resistors, regardless of ampere rating, are of equal size. The thickness of the resistance strip is the only part that varies.

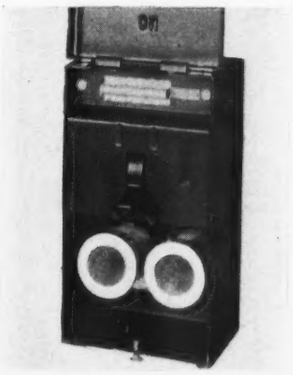
Two continuous unbreakable strips of a rust-proof, noncorrodible alloy constitute the resistance elements. The method of supporting the strips, combined with the ribbing, permits the strips to expand and contract freely during temperature changes. Its unbreakable and permanent features are obtained by eliminating all brittle material and by the use of mica for all insulation.



Switch, Manual Starting

General Electric Co., Schenectady, N. Y.

Having a maximum rating of 1 hp. at 110 volts, and 2 hp. at from 220 to 600 volts, three phase, this across-the-line starting device, designated CR-1038-E-1, consists of a tumbler switch and two small thermal cutouts mounted on a common textolite base. By means of suitable interlocks the switch can be locked in either the open or closed position.



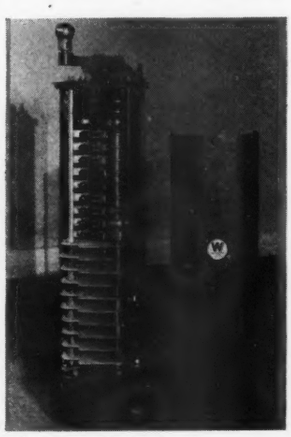
The cut-out links are made of tinned copper to prevent oxidation, and the contact spring and post are also tin plated for the same reason.

Controller, Reversing Drum

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

These reversing drum units, known as Type A controllers, listed in classes 8300 and 8400 for d.c. service, and in classes 12-700 and 12-800 for a.c. service are for heavy usage.

The drum cylinder consists of rolled brass supporting disks assembled on a micarta-insulated steel shaft between brass and micarta insulating collars. The contact segments, which are reversible, are bolted to the supporting disks in such a way as to entirely eliminate burning of the bolt heads. The fingers are of the compensating, self-aligning, adjustable type. Localized heating of the joints is prevented by copper shunts.



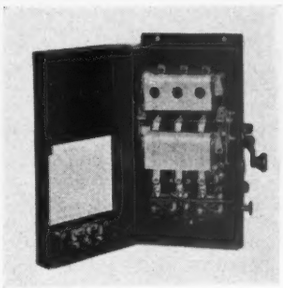
Starter, Combination Automatic

Square D Co., Industrial Controller Division, Milwaukee, Wis.

Each combination starter is a complete unit consisting of an across-the-line starter combined with a motor circuit switch mounted together in one cabinet. The motor switch not only acts as a disconnecting switch, but also is capable of opening the circuit while the motor is under load.

These combination starters are arranged for the insertion of a test jack which may be ordered separately when desired as only one is needed for an installation of several starters.

They are made in three capacities and 6 types, and may be obtained with fuse blocks between the motor circuit switch and the starter if desired.

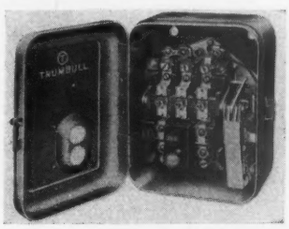


Switch, Type M 7½, Magnetic Starting

Trumbull Electric Manufacturing Co., Plainville, Conn.

Type M 7½ magnetic starting switch for across-the-line motor starting is of a design providing thermal protection against overload or damage due to phase failure. The control may be made either local, local and remote, or automatic with the change of one connection on the control terminal board.

Inclosed in a box measuring 6½ x 8½ x 4 1/16 in., the mechanism includes Duo-break contacts having a wiping motion under pressure and built-in thermostatic control with interchangeable heating elements ranging in capacities from 1 to 20 amperes according to the full load of the motor to be controlled.

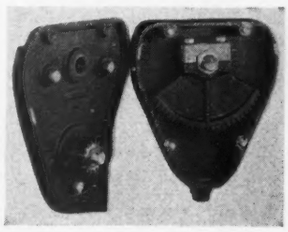


The switch was designed with a maximum rating of from 1½ to 5 hp. and from 3 to 7½ hp. for polyphase and single-phase, 115-, 230-, 460- and 575-volt circuits, respectively.

Switch Operating Mechanism, Drum

General Electric Co., Schenectady, N. Y.

A type of operating mechanism for use with drum switches mounted in crane cabs and similar places that supersedes the rack-and-pinion under-lever type, and which eliminates the trouble experienced in keeping a perfect lineup between the shaft of the operating mechanism and the drum switch shaft.



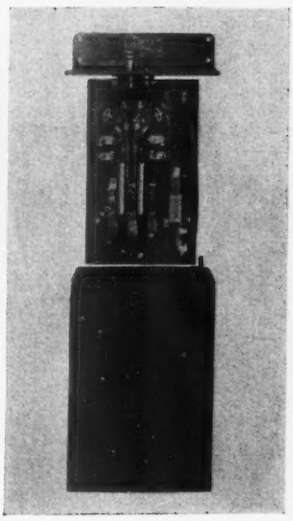
As the segment gear and its shaft are capable of assembly at different positions, varying by 60-deg. increments, the operating lever may be located in other normal "off" positions than the one at right angles to the conventional center line of the switch. The gear ratio is such that the movements of the operating lever is nearly a straight line for the reach rod and is laid out to give a linear travel equal to older designs.

Switch, Magnetic with Oil-Immersed Contacts

General Electric Co., Schenectady, N. Y.

An oil-immersed magnetic switch of small capacity, designated as CR-7006-V-7, which is intended to be used in gaseous atmosphere or in locations where highly corrosive gases or acids are encountered. It has a capacity of 40 amp. at voltages from 110 to 600.

The inclosing tank which is

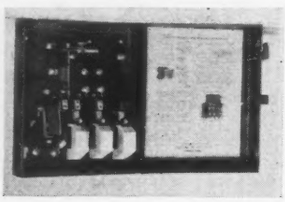


provided with a felt gasket to prevent the entry of dust is made of ¼-in. sheet metal with a flange for wall mounting.

Linestarter, Dust-Tight, Deion

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

These remote-controlled, nonreversing, across-the-line type magnetic starters for single- and polyphase squirrel-cage in-



duction motors are adaptable for use where a dust-tight weather-proof starter is desirable.

There are threaded openings for the conduit in the top and bottom of the cast-iron cabinet and a gasket seal on the door to make it dust proof and water proof.

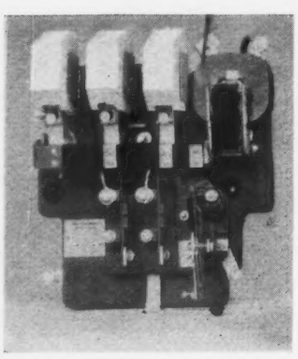
All dust-tight linestarters are equipped with the Deion grid-type arc quencher. To prevent the operator from breaking the seal whenever the motor is put back into service after an overload, the two small size linestarters are equipped with automatic reset thermal overload relays which have interchangeable heaters, an accessible calibration lever, and quick make-and-break contacts.

These starters are made in three sizes up to 50 horsepower.

Linestarter, Without a Cabinet

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Unlike other linestarters, this unit is furnished without a cabinet, and in three sizes covering a range up to 50 horsepower. It is equipped with the Deion arc quencher and the thermal overload relay.



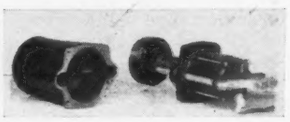
Another added feature is the combined hand and automatic reset thermal overload relay, which relieves the operator of the necessity of going to the starter to put the motor back on the line after an overload.

Operator, Hydraulic

General Electric Co., Schenectady, N. Y.

Designed to take the place of large a.c. or d.c. magnets and solenoids, the Hydraulic Operator, may also be used to replace air cylinders where quiet and smooth upward thrust is desired through a given distance.

It consists of a motor-driven centrifugal oil pump, the impeller of which is mounted in a piston and driven by means of a spline shaft. This arrangement permits the stationary mounting of the motor. When energized the motor drives the impeller creating a pressure between the bottom



of the piston and the bottom of the cylinder.

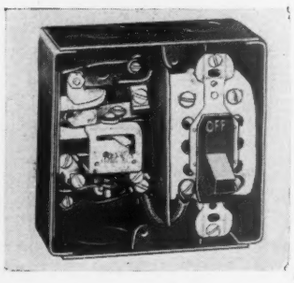
Rated on the stalled thrust basis, the three standard sizes give 200-, 300-, and 600-lb. push.

In addition to the foregoing applications the device may be applied to brakes, clutches, door and window openers, spot welders, pumps and other applications utilizing solenoids and air cylinders.

Breaker, Overload

Allen-Bradley Co., 286 Greenfield Ave., Milwaukee, Wis.

Suitable for use with d.c. also single-phase and polyphase a.c. motors, the overload breaker



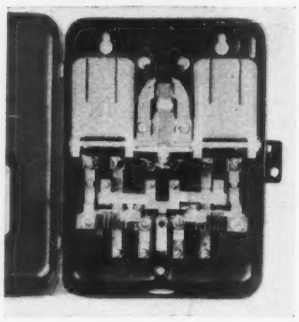
illustrated, is put out in six forms and in capacities up to 1½ hp. at 220 volts.

It is designed for protection against burnouts and overload and may be obtained with or without snap switch and fuse clips.

Starter, Across-the-Line

Sundh Electric Co., Newark, N. J.

All parts of this across-the-line starter, designated "6013 Aclinestor," include: few moving



elements; no iron current-carrying parts; ventilated arc shields of cold-molded asbestos; switch and thermal relay on different bases, the latter being adjustable for time interval; and pushbutton bases recessed for protection. All connections go straight through the starter from line to load.

Switch, LS-438, Limit

General Electric Co., Schenectady, N. Y.

Electrically, it is a two-circuit switch which, by a simple adjustment, can be made either normally-open or normally-closed, or one circuit open and one closed. It is a snap-action, cam-operated device and can be

obtained with either spring or star-wheel return with any one of four operating levers; a roller level with a 1-, or a 3-in. roller, a forked lever or a straight lever.

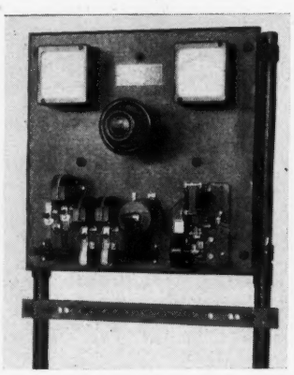
Starters, Synchronous Motor

General Electric Co., Schenectady, N. Y.

Special features incorporated in the redesign of three synchronous motor starters include the rectangular-type meter with non-glare glass, and an improved type of field actuating relay. CR-1135 designates the line of semi-magnetic, reduced-voltage starters; CR-7061 covers the magnetic-reduced voltage starters, and designation CR-7065 is assigned to the line of magnetic full-voltage starters.

In the CR-1135 starter the field-actuating relay is energized at the time the handle is moved to the run position. This relay operates and energizes the field contactor which applies excitation to the motor field.

Pushing the start button of the redesigned CR-7061 starter energizes an accelerating contactor which connects an auto-transformer to the line and the motor to the taps of the auto-transformer. Simultaneously, a definite-time relay is energized. After a time interval corresponding to the setting of the definite-time relay, the accelerating contactor opens disconnecting the auto-transformer from the line and the



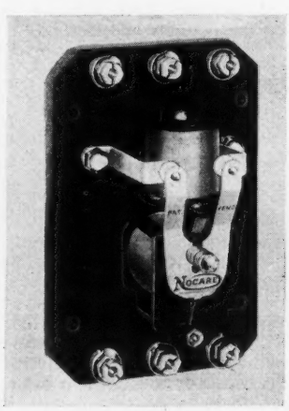
motor, and the line contactor closes connecting the motor directly to the line.

Pushing the "start" button in the CR-7065 starter energizes the line contactor which connects the motor directly to the line. The field-actuating relay then functions as described, closing the field contactor, and field voltage is applied to the motor.

Control, Safety

Ross Safety Switch Corporation, 1 East 42nd Street, New York City.

This safety control differs from the regular across-the-



line starting switch in that it is connected in but one side of the circuit, the coils of which are energized only momentarily during the period of operation.

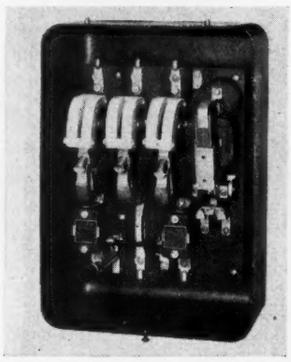
It consists essentially of two electromagnets and a main load contactor. The closing coil when energized by the control unit draws the main contactor closed, where it is locked in position by a latch. The contactor then is opened only by energizing the upper coil, which lifts the latch and frees the contactor.

No transformer is required with the load or control contacts.

Switch, Across-the-Line Magnetic

General Electric Co., Schenectady, N. Y.

This magnetic switch, designated CR-7006-D-30, supersedes the CR-7006-D-4 unit, which was designed primarily for throwing small motors di-



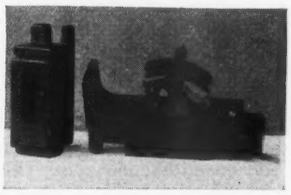
rectly across the line. It can, however, be used as a primary switch for slipring motors having secondary control.

Its design changes include the use of a molded shaft which will not stick in the bearings; thermal overload relays with interchangeable heater units, and reset button extending through cover. The horsepower ratings at various voltages are as follows: 110 volts, 7½ hp.; 220 volts, 15 hp.; 440/600 volts, 15 hp. For straight starting duty where no jogging is encountered, the 15-hp. rating at 440/600 volts can be increased to 20 horsepower.

Circuit Breaker

The Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Based on the Deion principle, and having a high-rupturing ability, this 15-amp. circuit breaker consists of a rugged toggle mechanism actuating the moving contacts to insure full contact pressure up to the time of opening, whether actuated automatically or manually.



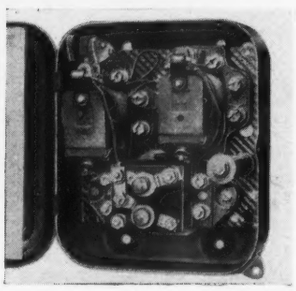
Automatic release is secured through the action of a bimetallic thermal element which engages the releasing latch of the mechanism. The thermal release element gives desirable inverse time limit characteristics.

All contacts are of especially developed, non-welding material. This circuit breaker is inclosed in an insulated sealed housing.

Starter, Across-the-Line

Cutler-Hammer, Inc., 150 12th St., Milwaukee, Wis.

Small size, double-line break, thermal-overload protection, low-voltage protection, and completely-inclosed structure are combined in the design of the automatic across-the-line starter for 115-, and 230-volt d.c. motors up to 2 hp. in capacity. The thermal overload relays may be adapted to any size motor by changing heater coils. The push-button master switch providing three-

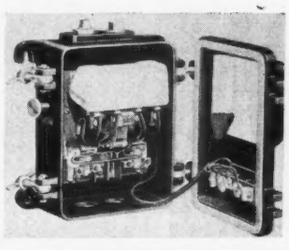


wire control, can be furnished for mounting in the cover or for mounting separately. Thermal overload relays may be omitted where overload protection is not required.

Switch, Motor Starting, Splash-Proof

The Allen-Bradley Co., 286 Greenfield Ave., Milwaukee, Wis.

This splash-proof, across-the-line starting switch for a.c. motors, is intended for use



where wash down of equipment is essential or where excessive moisture or dust is present.

Complete overload, no-voltage, and dead-phase protection are provided. It is rated up to 3 hp. on 110 volts and 5 hp. on 220 volts for single-phase motors, and up to 5 hp. on 220 volts and 7½ hp. on 440-550 volts for polyphase motors. The switch is furnished in three forms: Form 1—with pushbuttons in cover, Form 2—for external pilot control and Form 3—with two-way lever switch.

Starter, Counter E. M. F. Automatic

Cutler-Hammer, Inc., 150—12th St., Milwaukee, Wis.

A counter E. M. F. automatic starter for small d.c. motor applications rated up to 2 hp. at 115 or 230 volts.

It consists of a main line contactor, an accelerating contactor, and an armature resistor.

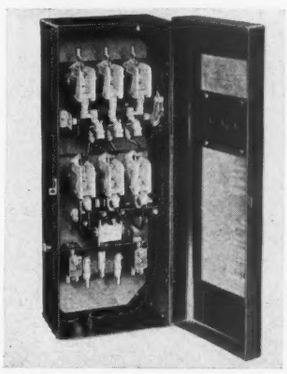
Each starter is supplied with a separate push-button master switch providing three-wire remote control.

Thermal overload relays furnished with the standard starter are of the fusible alloy type and can be made applicable to motors of various sizes by changing the heater coils.

Motor Starters with Disconnects and Test Jacks

Allen-Bradley Co., 286 Greenfield Ave., Milwaukee, Wis.

These starters consist of standard a.c. across-the-line switches equipped with hand-operated



disconnect switches and meter test jacks mounted in one cabinet.

They provide overload, dead-phase, and no-voltage protection, and are rated up to 10 hp. at 110 volts, 30 hp. at 220 volts, and 60 hp. at 440-550 volts. Form 1 is arranged with push buttons in the cover; Form 2 for pilot control, and Form 3 with three-way lever switch.

Control Switch, Type CR-7006-F-1

General Electric Co., Schenectady, N. Y.

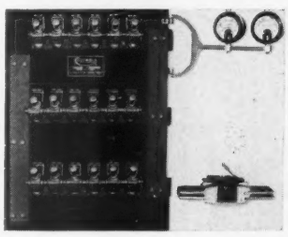
This switch can be applied to control any motor where a general-purpose magnetic switch would be used. It was developed to take the place of the magnetic switch, motor circuit switch and inclosed fuses usually required in controlling the operation of a motor.

Overload protection is provided by two temperature overload relays which open the contactor when overloads occur. The relays are so designed that they will trip the contact mechanism just before the overload will cause the motor to be excessively heated.

Rheostats, Cast-Grid Tank

Columbia Electric Manufacturing Co., 1292 East 53rd St., Cleveland, Ohio.

These rheostats are manufactured in standard sections of 800-amp. capacity or smaller,



which are mounted together for units of greater capacity.

They are uniform in cross section and mounted in the rear of the panel on three mica insulated tie-rods.

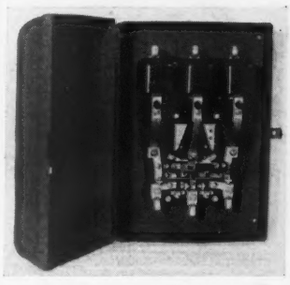
A series of renewable current-carrying contact studs and fingers operated by cam action toggles control the sections of resistance to be introduced into the circuit as required.

Magnetic Switch, Series KYR, Heavy-Duty

Diamond Electrical Manufacturing Co., 1318 East 16th St., Los Angeles, Calif.

Series KYR designates the heavy-duty magnetic switch designed as a supplement to the KXR switch.

Special features include: Interchangeable thermal ele-



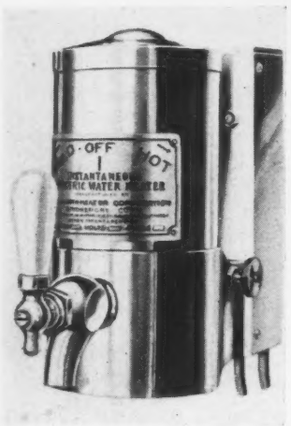
ments; bakelite panel assembly; concentric knockouts on four sides and back; and blow-out coils for higher ratings.

Heating and Ventilating Equipment

Heater, Electric Water

Acorn Heater Corporation, State and Bostwick Aves., Bridgeport, Conn.

Designed for permanent installation and furnished in single-, four-, and twelve-faucet types, this heater pro-

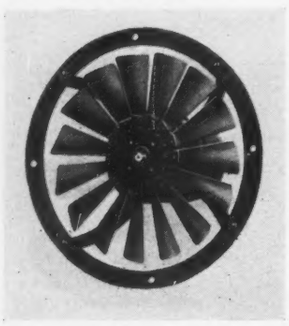


vides for an unlimited supply of hot water by turning the handle, which controls the flow of water and the heat-element switch. Hot water is obtained by turning the handle to the right, and cold water by turning it to the left. The heater is provided with a temperature control valve so that water may be heated to the desired temperature.

Ventilating Fan

Peerless Electric Co., Warren, Ohio.

This general-purpose ventilating fan is available in 18- and 24-in. types, driven by either single- or polyphase 110- or

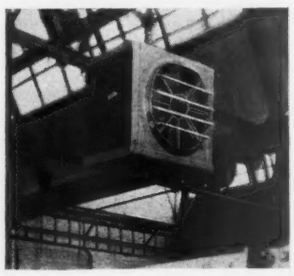


220-volt, fully-inclosed motors. The fan blades are designed to deliver a steady, non-pulsating current of air.

Unit Heater

Modine Manufacturing Co., Racine, Wis.

Model No. 1401 differs from other Modine units in that it has two heating condensers, one on each end of the unit.

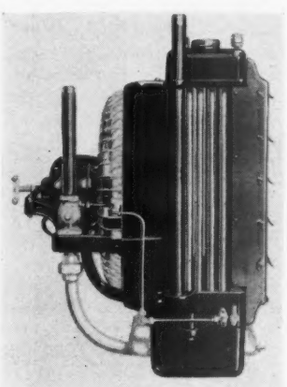


This heater is designed to be suspended directly from the steam main, the use of pipe straps being recommended to insure a secure installation. Its capacity is 320,300 B.t.u. per hour at 5-lb. steam pressure when the temperature of the entering air is 60 deg. Fahrenheit.

Unit Heater, Gas-fired

General Gas Light Co., Kalamazoo, Mich.

Although similar in appearance to other unit heaters, the Humphrey industrial unit consists of a battery of brass tubes



arranged above a bank of special Nichrome gas burners. Behind the radiator tubes is a fan propelled by a 1/6-hp. motor. The air from the fan is driven across the tubes accelerating the heat transfer. Part of the air is diverted to the burner box thereby increasing burner efficiency.

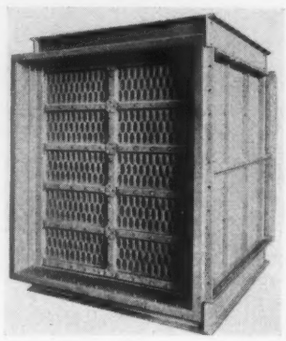
Heat control can be maintained by a thermostat arranged to actuate the motor. The gas is regulated by a governor on the motor. A thermostatic switch prevents its operation when pilot lights are out.

Heaters, Air

Shaw-Perkins Manufacturing Co., Oliver Bldg., Pittsburgh, Pa.

One of the features in the design of this heater is the use of stream-line oval tubes. The stack gases passing over the staggered tubes scrub the entire surface of the stream line ovals. The air passing through the tubes is confined by the oval to an extended area of hot metal.

Heating elements are furnished in four header sizes of ten lengths each permitting a great number of assembly arrangements and capacities. The elements which are resistant to



flue gas action contain no mechanical joints, and may be installed or removed through either of the two sides of the heater.

Heater, Strip

General Electric Co., Schenectady, N. Y.

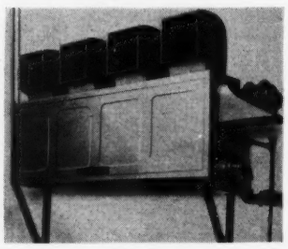
This electric strip heater which may be applied either as an

air heater or as a "clamp-on" device, is 24 in. long, 1½ in. wide and ⅜ in. thick. It is rated 500 watts at 110 or 220 volts. Mounting slots are provided in each end allowing the heater to be supported in air or clamped to a metal surface.

Unit Heaters, Lowboy and Highboy

Buffalo Forge Co., Buffalo, N. Y.

The illustration shows the "Lowboy" unit which has but one section of radiation, the Highboy has an additional heater section below the one shown. The construction is such that both the blower drive and heating unit connection can be assembled at either end, and the motor bracket can

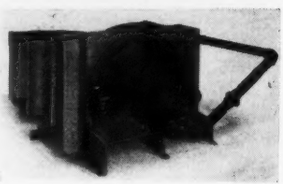


be revolved to assume any position of discharge. The universal Aerofin heating elements which are suitable for pressures from 2½ to 150 lb. may be removed from either end. The multi-rotors, using a modified backward-tipped blade, are of the centrifugal type each in its own housing. These heaters may be installed vertically, horizontally or in an inverted position.

Unit Heater Steam Turbines

Murray Iron Works Co., Burlington, Iowa.

A small steam turbine for use with unit heaters from which



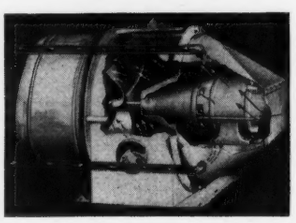
steam is exhausted into the coils supply about two-thirds of the heating requirements of the unit, the remaining one-third being supplied through a by-pass. Valves are provided to control the turbine speed and amount of by-passed steam.

Ventilating Unit, Explosion-Proof

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago, Ill.

An electrically-welded and bolted explosion-proof ventilating unit suitable for a variety of ventilating conditions.

A flexible pipe supplies air circulation for cooling from the outside of the building. The unit is supplied in sizes and may be equipped with either a.c. or d.c. motors.

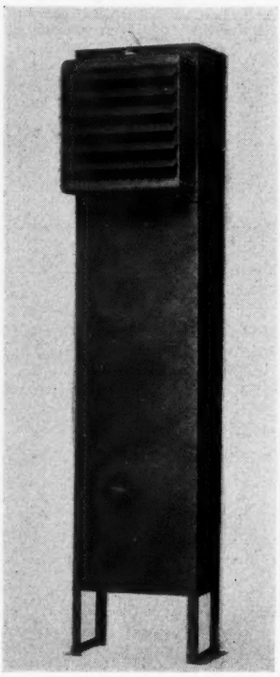


Unit Heater in Recirculating Box

Young Radiator Co., Racine, Wis.

Units of this type are made in four sizes to take care of a wide range of heating requirements.

Each unit consists of a heat-



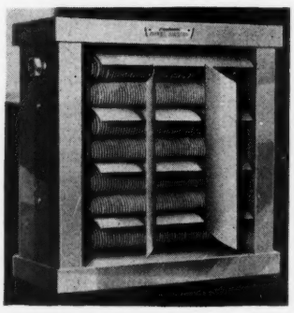
ing element suitable for both heating and ventilating service incorporated in a recirculating box designed for floor mounting. The heating sections consist of flat verical copper tubes with brazed flat copper fins. Thermostatic control is provided when desired.

Unit Heaters, "Speed Heater"

B. F. Sturtevant Co., Hyde Park, Boston, Mass.

Three types make up this "Speed Heater" line, each type having a two-speed motor. Type 1 operates at 750 and 900 r.p.m., Type 2 at 870 and 1,170 r.p.m., and the Cabinet Heater at 350 and 750 r.p.m. Steam pressures up to 250 lb. may be used.

They are equipped with



Aerofin radiators, and vertical louvers to break up the air flow by spreading it over a wider area. All types have hangers.

Lighting Accessories

Hand Light, Portable

Benjamin Electric Manufacturing Co., 128 S. Sangamon St., Chicago, Ill.

In this portable hand light, a special floating socket and four flexible springs absorb shocks that would otherwise be transmitted to the lamp filament. This portable device will take lamps of from 25 to 60 watts

in capacity. A fiber half shade is attached inside the guard to direct the light rays on the work. The handle is of varnished hard maple to which is attached a notched fiber guard that prevents the light from rolling when placed on a flat surface.

Deposit Remover Method, Incandescent Lamp

General Electric Co., Cleveland, Ohio.

A practical method for removing the black deposit which collects on the inner surface of high-powered incandescent lamps. The deposit-remover is a tablespoonful of coarse tungsten powder placed inside the incandescent lamp before it is sealed. After the lamp has become blackened from use, the operator needs but to shake the lamp and the tungsten will sweep the filament deposit off the inner glass surface. This method for cleaning the inside of the bulb has been applied to high-intensity lamps.

Sockets, "Textolite"

General Electric Co., Bridgeport, Conn.

The sockets rated 660 watts, 600 volts, and listed as GE-2750 and GE-2751, are composed of molded "Textolite" bodies to which are assembled a crew shell and center contact with leads attached, and made weatherproof by means of a special bushing.

They are for use in outdoor string lighting, signs, damp cellars, or any place subjected to dampness, weather, steam, vapor or acid fumes.

Diffuser, Glassteel

Benjamin Electric Manufacturing Co., 128 S. Sangamon St., Chicago, Ill.

Known as the Type 79 Glassteel Diffuser, this fixture consists of two parts; a per-

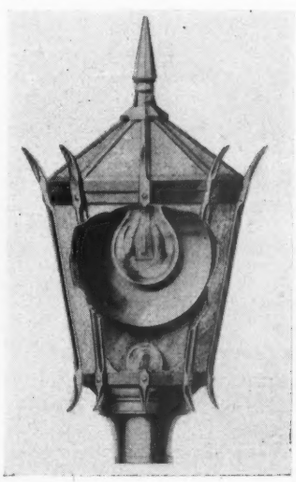
manently-wired base pendant stem or outlet box; and that part comprising reflector, lamp and glass inclosing glove. As a unit it is attached to the terminal base by means of a bayonet joint and securely locked in place with a 60-deg. clockwise turn. A counter-clockwise turn releases the unit. A clean unit may be inserted while the dirty unit is being cleaned.

A four-point spring suspension ring carries the inclosing globe and prevents it from working loose.

Floodlights

King Luminaire Co., 53 W. Jackson Boulevard, Chicago, Ill.

In this line of floodlights the reflectors and lamps are inclosed in an ornamental lantern

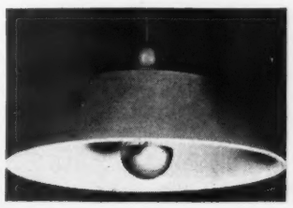


thereby serving the dual purpose of floodlighting, plus the ordinary illuminating functions. This equipment may be had in a wide range of designs and sizes to meet the various conditions encountered in industry.

Lighting Unit

Silvray Co., 53 W. 14th St., New York, N. Y.

This line of lighting units for industrial illumination employs



the principle of indirect lighting with the consequent elimination of glare.

Each unit consists of a porcelain enameled reflector of large diameter, having a special reflecting finish, and which is used in conjunction with the Silvray indirect lamp that has its lower portion silvered to about maximum diameter.

Extension Cord Set

Resilient Terminals Co., 88 Tenth St., Oakland, Calif.

Designed for heavy-duty service, this safety-type extension lamp device, known as the Unicord, is suitable for use where an extension cord is needed in industrial plants. It combines in one piece a lamp socket, a standard rubber cord, and a terminal or plug. All plugs are covered with soft rubber thereby eliminating danger of breakage.

Fixtures, "Duratach"

Wheeler Reflector Co., Boston, Mass.

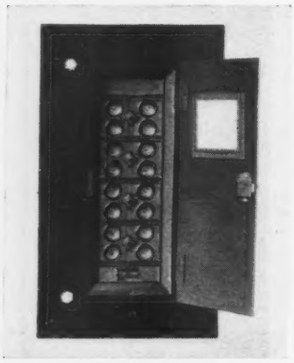
One of the features emphasized in the "Duratach" fixtures is that any Duratach canopy, when the reflector is removed, can be used as a convenient outlet to receive a standard attachment plug. It permits of as many convenient outlets as there are Duratach canopies installed.

Duratach construction permits the socket shell to revolve with the reflector as it is screwed in or out of the canopy. All mechanical and electrical connections are made in one operation.

Panelboard, Narrow

Square D Co., Detroit, Mich.

These lighting panelboards are 12 in. wide over all (6-in. panel and 3-in. gutter all around), which allows them to



be used in places where a larger panelboard could not be conveniently installed such as on supporting girders.

They can be supplied with cartridge fuses as well as plug fuses. Switch circuits as well as fuses only, can be supplied in the branches.

Cover Guard, Dust-Tight

Benjamin Electric Manufacturing Co., 128 S. Sangamon St., Chicago, Ill.

A wire guard to protect the glass disk of Benjamin dust-tight covers against breakage and damage. Heavy-gage steel

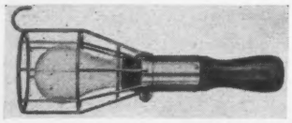
wire is used in making the guard, each joint of which is securely welded and heavily tinned to prevent corrosion.

In attaching the guard to the dust-tight cover the spring clamp on the retaining band of the dust-tight cover is released and the four steel lugs welded to the guard rim are inserted under the band. The spring clamp is then snapped into the closed position and the guard is held firmly in place.

Lamp Guard, Portable

Electric Portable Co., 879 E. Harrison St., Portland, Ore.

Ample protection for lamps up to and including 50 watts in size is provided with this portable lamp guard, which is made of steel wire electrically welded.



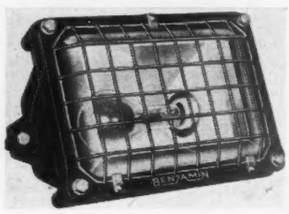
Standard keyless weatherproof sockets from 1 7/16 to 1½ in. in diameter can be accommodated by this guard.

Lighting Unit, Pit

Benjamin Electric Manufacturing Co., 128 S. Sangamon St., Chicago, Ill.

A lighting unit for built-in installation in locations where space limitations or unusually severe service and atmospheric conditions make the use of ordinary types of overhead or side lighting equipment unsuitable. The heavy cast-iron body in this pit lighting unit sets back in a recess in the masonry permitting full use of the working area.

A brass wire guard protects the Pyrex heat-resisting glass



cover of the reflector, which is made of porcelain enameled steel of a special trough shape design. It has a wide lateral distribution and accommodates either 100- or 150-watt lamps.

Reflector, Type 79, Dome

Benjamin Electric Manufacturing Co., 128 S. Sangamon St., Chicago, Ill.

There are only two separable parts to the Type 79 RLM dome reflector which was so constructed as to permit it to be taken down with the lamp with one movement for cleaning.

Of these two parts the hood contains the wiring terminal

base, the reflector being the lamp holding element.

A three-point bayonet coupling locks the hood and reflector units together and at the same time completes the electrical connections.

Projectors, Floodlight

General Electric Co., Schenectady, N. Y.

A small three-point base design and swivel mounting is used with the three classes of projectors making up this line. Non-ferrous casings are used, and the glass reflectors and lamps are totally inclosed so that dust and dirt cannot enter to impare efficiencies.

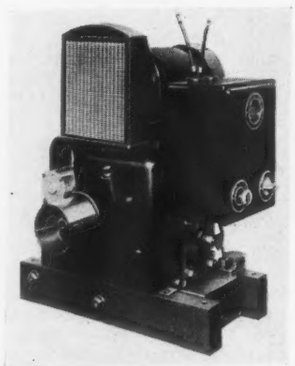
Where the available space is limited, the type L-29 projector,

designed primarily for use with 250-watt floodlighting lamp, is used. This lamp is suitable for working distances of from 85 to 200 ft. The type L-30 projector is for use with a 500-watt floodlighting lamp. For it there are three reflectors, one giving a medium-angle beam for working distances up to 400 ft., one for 100 ft., and one of special construction that gives an asymmetric distribution when used with a spread-light lens. The design of the type L-31 projector calls for the use of a 1,000-watt lamp. All lenses are of heat resisting glass.

Light Plant, Self-Contained Auxiliary

Fairbanks-Morse & Co., Chicago, Ill.

Designed for 750- and 1,500-watt capacities, these units are adaptable for use on cranes,



dredges, or isolated locations where a source of power to supply illumination for night work is required.

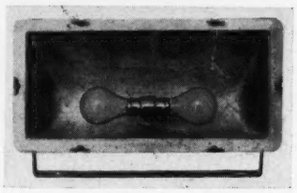
In the assembly the power unit, the ignition system, the generator end, and the control mechanism are maintained as separate units. The engine used is the Fairbanks-Morse self-oiling "Z" engine with high-tension magneto ignition. The smaller 1½-hp. unit is designed to operate on gasoline as fuel, whereas the 3-hp. engine can use either gasoline or kerosene. The generator is mounted as a unit directly above the engine and driven by means of a Flex Mor "V" belt.

Lighting Unit, Cornice

General Electric Co., Schenectady, N. Y.

Known as Type L-32, this floodlight is suitable for mounting on the top of a cornice to eliminate the shadows created from floodlights mounted below.

It consists of hot-dipped galvanized, cast-iron casing equipped with a twin socket for



two 50-, 60-, 75-, or 100-watt general service lamps.

By means of a trunnion bracket, provided for mounting, the casing may be adjusted to any position.

Lamps, Inside Color-Processed

General Electric Co., Schenectady, N. Y.

Application of the inside-colored process has been made to the 10-watt, 110-, 115-, 120-volt, S-11, intermediate, screw-base Mazda lamps.

With the inside-colored finish the bulb has a smooth outside surface. There is less tendency to collect dirt, and the colors are not affected by the weather.

Standard colors include red, yellow, green, blue, amber-orange, flametint, and white.

Lubrication Devices

Fittings, Drive

Alemite Manufacturing Corporation, 2650 N. Crawford Ave., Chicago, Ill.

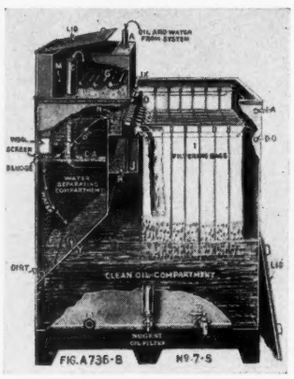
Since no threading is necessary, these drive fittings, which are made in 1/64-in. sizes ranging from ⅛ to ½ in. for all open

oil holes, can be permanently installed in less than two minutes with a hammer and a set of three special drive tools. The procedure is as follows: Drive a reverse feather-edged bushing into the open oil hole and into this bushing install a nipple with a dirt-proof ball check. Special bushings are made for countersunk holes and for thin housings.

Oil Filter, Automatic

Wm. W. Nugent & Co., 410-12 N. Hermitage Ave., Chicago, Ill.

In this oil filter an automatic water separator indicates by a



bell or light, or both, when cleaning is necessary.

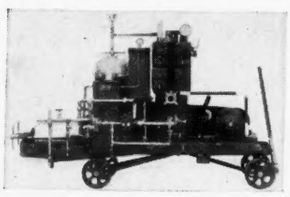
Capacities range from 40 to 2,000 gal. per hour.

Oil Purifier, Model F-50

Hydroil Corporation, Lebanon, Ill.

A fully-inclosed, non-aerating, fully-automatic oil purifier with a capacity of 500 g.p.h. in which the oil is forced through 64 sections of 7 x 7-in. filter paper by means of two 600-g.p.h. pumps.

All running parts in this unit are equipped with precision



ball bearings of the deep-groove type.

Automatic oil control is obtained by means of a regulating valve which once set maintains a constant pressure, and a constant flow of oil through the machine. An automatic drain through the filter pan controls the removal of oil leaking from the filter papers.

This 5-hp. model is equipped with immersion-type heaters of from 3 to 8 kw. in capacity, which can be manually operated or thermostatically controlled.

Oilers, Pistol

Plews Oiler Co., 258 Sexton Bldg., Minneapolis, Minn.

When held in any position these Pistol oilers, which are of the force-feed type and desig-

nated as No. 100 Model, will pump either light or the heaviest oil. They are made in capacities ranging from ¾ pint to 1 quart. The pump consists of a brass tube which slides over another brass tube held in a fixed position. A spring inside the lower tube returns it after each stroke. Metal ball valves are used in the base of each tube instead of leather valves or plungers.

Oils and "Cosmolubrics," Absorbed

Houghton & Co., Philadelphia, Pa.

Absorbed oils consist of two oils in one; a film oil, and a "lubricity" oil. The film oil acting as a piece of blotting paper holding the lubricity oil on the bearings.

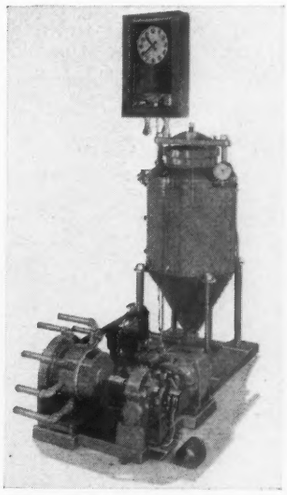
Under slight pressure, a small amount of lubricity oil is present at the surface which, under high pressure a greater quantity is squeezed out of the film oil. When the load is decreased the film base re-absorbs the lubricating oil and retains it. The line of "Cosmolubrics" contains oils from the very light to those of extremely heavy body.

Lubricating System, Pneuma-Lectric

Keystone Lubricating Co., 21st, Clearfield and Lippincott Sts., Philadelphia, Pa.

Combined in this automatic, intermittent-feed lubricating system are the Keystone pneumatic safety lubricator and a rotary distributor. A system of pipes delivers the lubricant from the distributor to the bearings of the equipment to be lubricated.

Pressure is maintained on the system by means of a motor compressor unit with an automatic switch. The rotary distributor is motor driven through a reducer. Operation of the system is controlled by an electric clock which may be set to any pre-determined time period from 5 min. to 4 hr.

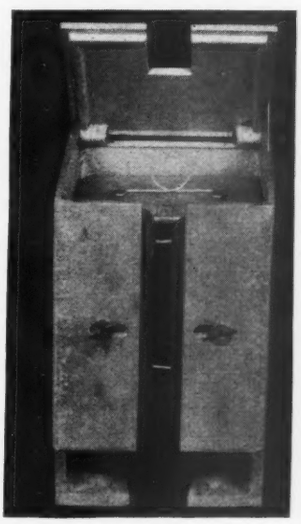


The rotary distributors are made in 2- and 8-in. sizes.

Lubricator, Elevator Guide-Rail

Yvan Zenon, 244-22 136th Ave., Rosedale, L. I., N. Y.

This device supplies lubricant to the guide rails of elevators only when the car is in motion. It is mounted on the upper end of the top guide shoes on the car and counterweights. A light grease and graphite compound is recommended to be



used in the lubricator for greasing the rails.

It is adapted to either slow-speed or high-speed elevators, and it may be used on cars operating at speeds as high as 750 feet per minute.

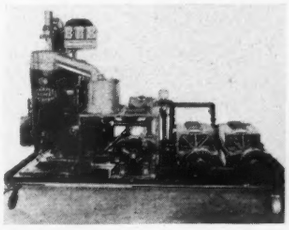
Each lubricator holds about two pounds of grease, which is sufficient for one year.

Oil Purifier, Combination

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

A super-centrifuge made by the Sharples Specialty Company, mounted on a truck with a Westinghouse filter press equipment makes up this combination.

Complete purification of 1,200



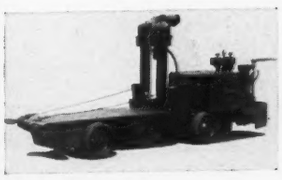
gal. of oil per hour continuously is accomplished in one operation. The complete unit occupies a floor space of 54 x 106 inches.

Materials-Handling Equipment

Truck, Type D-96, Storage Battery

The Baker - Raulang Co., Cleveland, Ohio.

In this Type D-96, articulated tilting truck the load section



consists of a tilting platform mounted on a single axle, and includes the hoist for tilting the platform, and a double-drum power winch.

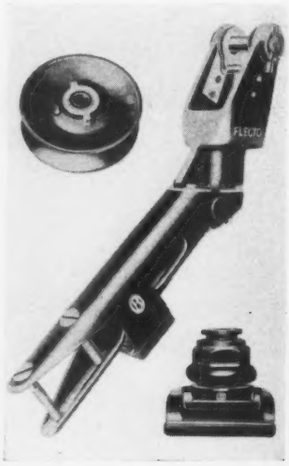
Being hinged in the center it is possible to make a very short turn from the loading dock through a 7-ft car door with a 48x102-in. package. This same truck may be used for unloading cars by using the cables to pull the package up onto the truck platform.

Trolley Harp and Pole, Head, Turret-Type Mine

Ohio Brass Co., Mansfield, Ohio.

This device is known as the turret type because of the turret-shaped bearing between the pole head casting and the swivel harp casting. Both harp and pole head castings are made of malleable iron.

When used for glider operations it utilizes the turret principle, but it is somewhat different in design from the wheel harp. Connection be-



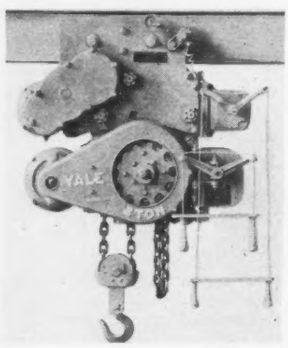
tween the glider and the harp is made by large ball-and-socket joints.

Where very heavy service is encountered and extremely high currents are used, a copper shunt is used to carry the current from the glider around the harp to the terminal on the pole head casting.

Trolley, Motor-Driven

Yale and Towne Manufacturing Co., Stamford, Conn.

Capacity loads of from one to three tons can be made with this motor - driven trolley, which can be adjusted to fit all standard I-beams of from 8 to 18 in. in depth. The combination distance from the underside of the I-beam to the



load hook is 29 in. on the 1-ton electric chain hoists, and 35 in. on the 2-ton hoist.

Power is transmitted from a ¾-hp., a.c. or d.c. motor through the inclosed spur-gear reduction which operates in an oil bath, directly onto two wheels of the trolley. The design provides for the ready attachment of a Yale Electric Chain Hoist or a Yale Chain Block of the hand type. A horizontal speed of approximately 150 f.p.m. can be obtained.

Where quick stopping is necessary the driving motor can be provided with a solenoid electric brake which operates directly on the motor-driven shaft. The trolley is arranged for either manual or push-button control.

Belt Conveyor Carrier

Stephens-Adamson Manufacturing Co., Aurora, Ill.

Improved end stands are standard equipment for all sizes of "Sacon" carriers supporting from 24- to 48-in. belts.

This outer support bracket fits closely to the pulley ends, furnishing protection to the end bearings from lumps catching between the pulley and bracket.

Locomotives

Cincinnati Car Co., (Locomotive Division), Cincinnati, Ohio.

The complete "Cincinnati Line" of industrial locomotives includes gasoline, gasoline-electric, Diesel, electric-trolley, and storage-battery types.

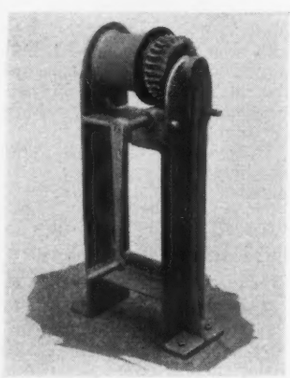
These locomotives are made in a variety of sizes from 2- and 3-ton units up to 50-ton or larger, and in various track gages, affording equipment suitable for handling small or large industrial cars in all kinds of service.

Winch, Floor-Type

Stephens-Adamson Manufacturing Co., Aurora, Ill.

Safety for the load is assured at all times by the self-locking, cast-iron worm gear of this floor-type winch.

Sustaining a rope pull of 750 lb., the cast-iron drum, which is 6 in. in diameter, has



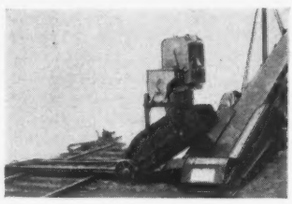
a capacity of 100 ft. of ¼-in. cable, or 60 ft. of ⅜-in cable. The winch is 54 in. high and 18 in. wide. Alemite high-pressure fittings are used to lubricate it.

Unloader, Car

Barber-Greene Co., Aurora, Ill.

This light car unloader for unloading hopper - bottomed coal cars was originally designed as a feeder attachment and constructed to take its power from a B-G flight conveyor.

The addition of a power unit, which may be either gas of electricity operated, converts it into a self-contained unloader. This model has a capacity of 1 ton a minute. It

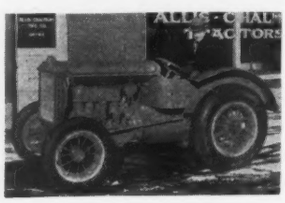


is 3⅝-in. high over the rails and allows ample clearance for the largest hopper doors. The complete machine weighs 1,700 pounds.

Tractor, Gas-Engine-Driven

United Tractor and Equipment Corporation, 612 N. Michigan Ave., Chicago, Ill.

A medium capacity tractor powered by a four-cylinder, 40-hp. engine of special Con-

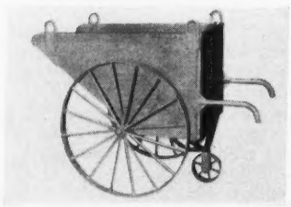


tinental design. An automotive-type transmission provides for four speeds forward and one reverse. The net weight of the unit is 3,900 lb. without water, fuel or special equipment. Its overall length is 118½ in. overall width, 63 in., height 53¼ inches.

Hand Truck, Industrial

Pittsburgh Producers Supply Co., 1115 Metropolitan St., Pittsburgh, Pa.

This truck has a rated capacity of from 1,500 to 2,000 lb., with a tare weight of 150 lb. The dimensions of the body are 36 in. long, 24 in. wide and 24 in. deep at the maximum



depth. It is mounted on two 30-in. wheels and one 8-in. pilot wheel having a 2x¼-in. tread. The body is made of steel sections welded together.

All three wheels also consist of welded parts, mounted on Timken bearings arranged to withstand the thrust load occasioned by the passage of the truck over rough or uneven surfaces.

Hoists and Cranes

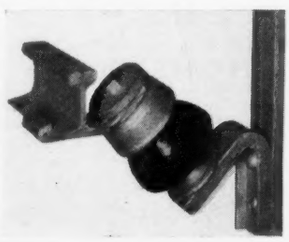
Robbins & Myers, Inc., Cleveland, Ohio.

All sizes and styles in both hand and electrically-operated hoists and cranes up to 10-ton capacity are represented in the line added to this company's products.

Support, Crane Rail

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

This crane rail support for supporting and insulating two No. 20 A. S. C. E. rails for crane runways was designed to replace the wooden brack-

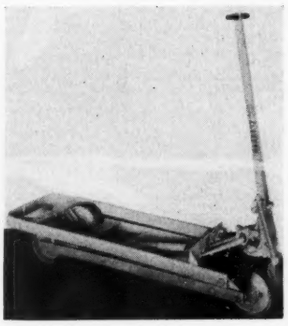


ets formerly used. This type of construction with the insulators on a 45-deg. angle is necessary in order to maintain the same distance out from the crane girder, as formerly used when the rails were supported on wooden brackets.

Lift-Truck, Hand-Operated

Barrett-Cravens Co., 1328 W. Monroe St., Chicago, Ill.

An all-steel lift truck, known as the "Red Head," which lifts the load with a single stroke of the handle when held at any angle. Other features include oilless bearing in the upper rear axle, a spring handle holdup, a positive latch engagement which cannot foul, a roller bearing latch catch, a pressed-steel platform stop, a



lifting mechanism adjustable for wear, a pressed-steel check brace, a drop-forged handle, and a 5-in. turn-table.

Locomotives, Gasoline, 1200 Series

Locomotive Division, The Cincinnati Car Corporation, Winton Place, Cincinnati, Ohio.

Four starting and traveling speeds, both forward and backward, are embodied in the design of the 1,200 Series of gasoline-powered, gear-driven, industrial locomotives.

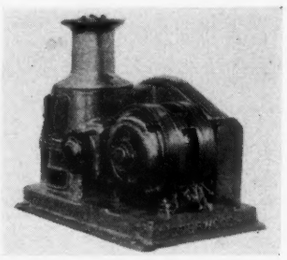
An electrically-welded, channel-steel sub-frame carries the complete power plant, transmission and all operating parts as a unit assembly which is rubber insulated from the main frame to cushion it against shocks and jars in service.

The different models in this series are all built in a variety of sizes and track gages, and they are adapted for handling either industrial cars or railroad cars.

Capstan, Vertical, "Tugmore"

Lidgerwood Manufacturing Co., Elizabeth, N. J.

Known as the "Tugmore," this vertical capstan for moving freight cars and barges in



industrial plants, has been made a standard type in five sizes: 5 and 7½ hp. for a.c. or d.c. service, and a 6- to 8-hp. twin-cylinder, air-cooled motor using gasoline or kerosene for fuel.

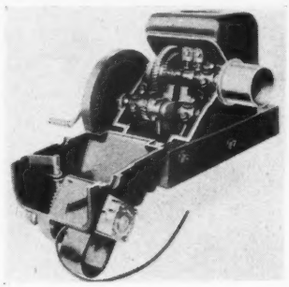
Both electrical and gasoline types are of weathertight construction.

Engines, Portable, Gasoline-Kerosene

Fairbanks, Morse & Co., Chicago, Ill.

An all-inclosed, self-oiling feature constitutes the most radical departure from previous construction in this line of 1½- to 7½-hp. gasoline-kerosene engines.

Two pulleys are provided; one of which operates on the engine speed of 1,500 r.p.m., and the other at 750 r.p.m. There is also a mechanical regulator which permits slowing the engine down to 1,100 r.p.m. with proportionate re-



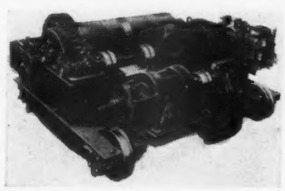
duction in horsepower. With two pulley speeds and the speed regulator, it is possible to meet the requirements of almost any type of drive.

Crane, Overhead Traveling

Whiting Corporation, Harvey, Ill.

Known as the Tiger, this crane employs herringbone gears in the hoisting train, trolley rack gears, and bridge drive.

Gears operate in a continu-



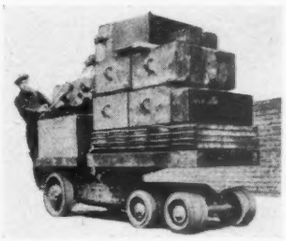
ous oil bath and all bearings are completely inclosed in oil-tight cases. The mechanical brake is lubricated and cooled by a forced lubrication arrangement made possible by taking advantage of the pumping action of the herringbone gears.

Tiering Truck, "Hi-Lo Tructor"

Elwell-Parker Electric Co., Cleveland, Ohio.

An Exide Iron-Clad battery of 24 cells is used to operate the 15-ton tiering truck, known as the Type ELB-30, "Hi-Lo Tructor," shown in the illustration.

Lifting the load is accomplished by means of one cable on the motor-driven hoist drum which is mounted over the battery compartment. These cables run over sheaves at the top of the elevator uprights, thence down to the elevator carriage which is as-



sembled integral with the load platform.

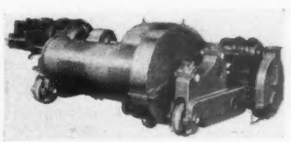
Each of the four trail wheels are equipped with two 15x15-in. solid-rubber tires distributing the load over the largest floor area possible.

Trolley, Crane

Shephard Niles Crane & Hoist Corporation, Montour Falls, N. Y.

In the trolley design brought out by the above company all the operating mechanism is totally inclosed.

Casings with small removable plates to facilitate inspection cover the high-speed reduction gear between the hoisting motor and cable drum



as well as the load brake and principal bearings, the final or slow-speed reduction to the cable drum and the reduction gear drive from the trolley motor. With this construction all gears are adequately protected from dirt, and the high-speed gears and load brake are maintained in proper alignment.

Brush, Conveyor Cleaning

Robins Conveying Belt Co., 15 Park Row, New York, N. Y.

Designed to give better cleaning results with less wear on the belt than the former types, this fluted-rubber cleaning device, known as the "Squeegee" cleaning brush, is made up of a series of rubber spiral flutes.

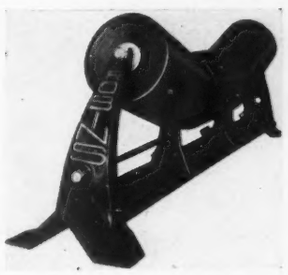
The roll is 7½ in. outside diameter and made up in sections 6 in. long. These sections are mounted on a wooden core the same diameter as used on the older type brushes.

Idler, Demountable Troughing

Robins Conveying Belt Co., 15 Park Row, New York, N. Y.

This idler, known as Style 203-YD, is similar to the 203-XR, three-pulley, Timken-bearing idler except that it has demountable pulleys, which with their bearings and grease seals are interchangeable.

Side pulleys are set at an angle of 20 deg. from the horizontal. The brackets between the pulleys and the ends



of the idlers are of malleable iron and are bolted to a structural-steel angle base. Lubrication is obtained by means of grease forced through three high pressure fittings.

Standard sizes range from 18 to 60 in. in diameter.

Tractor, Electric

Mercury Manufacturing Co., Chicago, Ill.

Like other Mercury models, this Type C machine is full-spring suspended front and rear on semi-elliptic springs. Its large wheels make it suitable for use outside as well

as inside of a plant. The rear wheels are 20 in. in diameter, the front wheels 24 in. in diameter.

It is powered with a G. E. motor, and equipped with the Mercury, patented, internal-gear-drive axle. The controller is of the full-drum type with five speeds forward and five in reverse.

With the average size bat-

tery it weighs approximately 5,000 lb. It will hold 30 23-plate Exide, or 48 A-10 Edison cells. It has a rated drawbar pull of 3,000 pounds.

Chain Hoist, Differential

Robbins & Myers, Inc., Springfield, Ohio.

Manufactured in five sizes with capacities ranging from ¼ to 2 tons, this differential

chain hoist employs Timken bearings in the lower hook to facilitate the turning of the load.

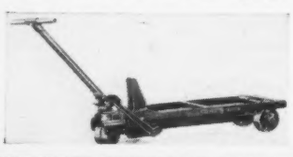
All sheaves are of "Aremite," the chains are of special analysis steel, electrically welded. With the exception of the chains, aluminum finish is provided throughout.

Truck, "Footlift"

Lewis-Shepard Co., 183 Walnut St., Boston, Mass.

A hand-lift truck designed for loads up to 3,500 lb. Elevation of the load is obtained by the operator stepping on a lever and letting his weight do the work.

A simple twist of the handle when it is in the upright



position prevents it from falling when not in use. It is used only for steering and hauling as it is never connected with the load.

Hoist, "Handy Andy" Electric

The Handy Hoist Co., 847 W. 120th St., Chicago, Ill.

A low head-room electric hoist, designated as "Handy Andy," with lifting capacities of 500, 1,000 and 1,500 lb. It is a fully-inclosed unit in which all working mechanism is incased in a heavy cast frame or housing.

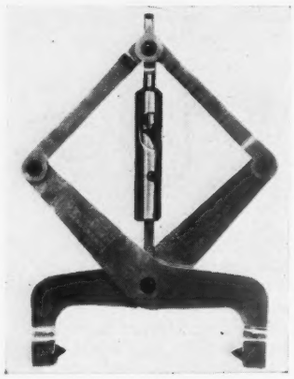
It is powered with a 110-volt universal motor; weighs 160 lb., and is 24 in. in length and 7½ in. in diameter.

Tongs, Automatic Safety

Heppenstall Forge and Knife Co., Pittsburgh, Pa.

Known as the Gellert Automatic Safety Tongs, these patented lifting tongs which are suspended from any kind of hoist by a single rope are manipulated by means of this rope only and by the craneman alone without any auxiliary men, power or appliance.

Normally, they are in the open position; a single down



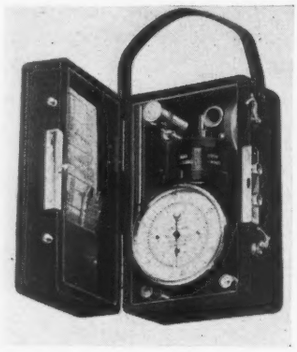
and up movement grips the load, and the subsequent down and up movement releases it, leaving the tongs again in the open position ready for gripping.

Meters and Accessories

Hand Tachometer

O. Zernickow Co., 15 Park Place, New York City.

The model shown is of the single-spindle, triple, quadruple, and quintuple selective-range type. The shifting is done by turning the tachometer

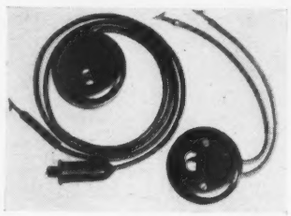


barrel until the desired range is indicated. The length of the instrument has been reduced one third. Speeds ranging from 20 to 40,000 r.p.m. can be measured with an accuracy of 0.5 per cent.

Fuse Tester

Electric Tester Manufacturing Co., 346 Sherlock Bldg., Portland, Oregon.

Known as the Johnson Fuse Tester, this device is designed to eliminate the hazards and

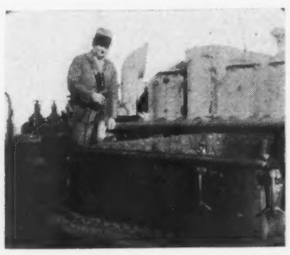


uncertainties connected with locating blown fuses, dead sockets, short circuits, and grounds. It consists of a resister coil inclosed in a heat-resistant and non-conducting circular case 2¼ x 1 in. in size. A small lamp burns dimly at 100 volts and brightly at 250 volts. It is provided with either 6-in. stiff or 18-in. flexible leads.

Indicator, Combustible Gas

Union Carbide Sales Co., 30 East 42nd St., New York, N. Y.

The presence of a wide range of combustible gases or vapors is immediately detected by this portable instrument which indicates whether or not the atmosphere containing these



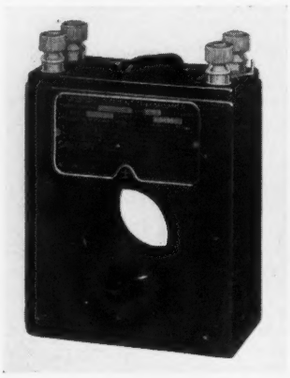
gases is of an explosive content or safe to breathe.

It utilizes the effect of the combustion of flammable gas and air mixtures on the surface of a heated filament. It is safe to operate in all gas-air mixtures except those containing acetylene or hydrogen.

Transformer, Instrument Current

Weston Electrical Instrument Co., Newark, N. J.

Model 539 current transformer is a small, lightweight unit, having a 1-amp. secondary. When used with a proper instrument of that range, current



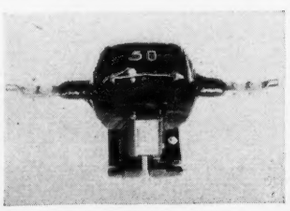
measurements can be made from 0.2 to 200 amperes.

It has four self-contained primary ranges of 2, 5, 10 and 20 amp. which are changed by means of a range-changing switch on the top of the transformer. Ranges of 200, 100 and 50 amp. are also available by passing the conductor, one, two, or four times through the hole provided for that purpose in the transformer. This is known as an inserted primary.

Transformers, Instrument Current

Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pa.

Hipernik instead of silicon steel is used for the core in the Type NA transformers,



which are suitable for all applications with secondary burdens up to 50 volt-amperes, at any power factor, at frequencies between 25 and 133 cycles, and on lines up to and including 6,900 volts.

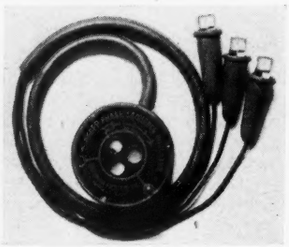
They are provided with feet suitable for mounting by means of standard N bolts. A secondary terminal block is provided on which are fixed studs to which the secondary wiring of meters, instruments or relays may be connected.

Although it is considerably lighter than similar transformers with silicon steel cores, it will withstand, mechanically, short-circuit currents up to 70 times normal primary rating for a time limit of one-half second. This transformer is available in sizes ranging from 5 to 1,200 primary amperes.

Indicator, Sequence Phase

Electrical Facilities, Inc., 3712 San Pablo Ave., Oakland, Calif.

This instrument was developed to eliminate the frequent losses due to wrong phasing-in by



maintenance men and is known as the "Knoop Phase Sequence Indicator." The indicator as illustrated is 3¼ in. in diameter, and 1 in. thick. It has a voltage range of from 50 to 500 volts. A pushbutton switch is provided for cutting the instrument in and out of the circuit.

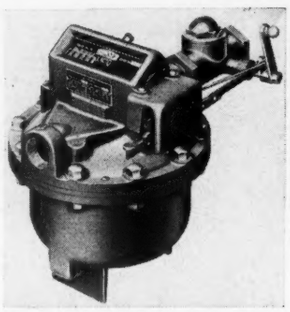
It can also be used for all polyphase testing in connection with watthour meters, reactive component meters, relays and so on.

Measuring Device, Liquid

S. F. Bowser & Co., Fort Wayne, Ind.

A predetermined liquid measuring device, employing the Xacto Meter as the measuring unit, that can be operated either by pump or gravity pressure.

This device repeatedly measures, records, and discharges one fixed quantity of liquid automatically.

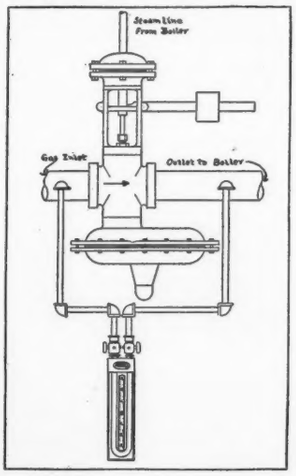


It may be used for measuring predetermined quantities of gasoline, lubricating oil, and light greases to tanks, crankcases, transmissions and so on.

Manometer, Combination

Meriam Co., Cleveland, Ohio.

This device is a modification of the regular U-tube manometer which permits the in-



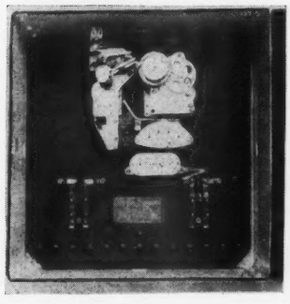
strument to be used either as a flow meter or as a pressure indicator. The operation of the instrument depends upon the fact that all manometers operate upon the differential principle, whether rate of flow or actual pressure is indicated.

Hitherto, it has been necessary to use two manometers when both pressure flow and readings were required, but the instrument described herein, avoids this difficulty by the use of a simple extra device.

"Limuter", Power Demand

The Steel City Furnace Co., Pittsburgh, Pa.

Known as the "Limuter," this device for automatically reducing demand peaks, works on



an integrated peak basis and reduces the demand by cutting off temporarily, for short periods of time, some portion of the plant load which can be dropped without serious inconvenience.

It is the function of the Limuter to cut the load when the predetermined amount of power has been used, and then, when the demand peak interval is over, to throw back automatically the apparatus into its normal operating condition.

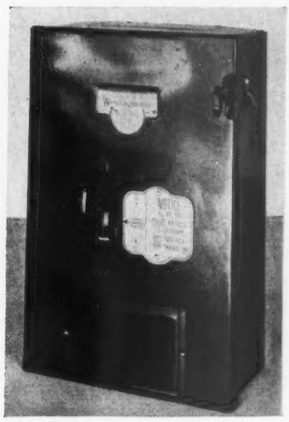
If the load cannot be automatically restored, a signal is used to indicate that the danger period is over and the load is thrown back on the line by hand.

Breaker, Meter Service

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Designated as the WK-50 Meter Service Breaker, this positive automatic unit which is for use on 30-amp., 125-volt, two-wire, solid neutral service is operated by a quick make-and-break toggle switch. The insulated handle can be locked in the off position if desired. The box, which is sealed inside an insulating cover, is arranged for ordinary meter trims and banking troughs.

The self-heating, bi-metal operating the latch on the breaker will not fuse on any overload

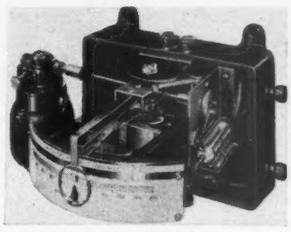


current that can be obtained at the rated voltage. In case of mechanical failure this U-shaped bi-metal acts as a link fuse and opens the circuit without injury to other parts of the breaker.

Pyrometer Control

Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill.

A combination of pyrometer control apparatus and mercury switch designed specifically for the control of electric furnaces and any type of fuel burning



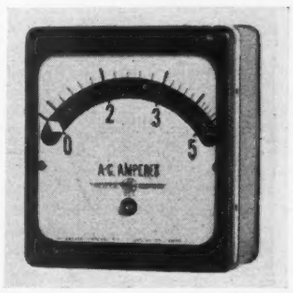
furnace. The combination may be applied to other control applications such as draft, pressure, and so on. The outstanding feature being the elimination of the usual open metallic contacts and the relays that previously have been required for controlling electrical loads of any magnitude.

Switchboard Instruments, Non-Glare Glass Equipped

General Electric Co., Schenectady, N. Y.

Use of a special glass which prevents glare is one of the features of this line of instruments for switchboards.

In this line the instruments



are uniform in size and appearance for both a.c. (Type AD) and d.c. (Type DD) ammeters, voltmeters, wattmeters, reactive volt-ampere meters, power-factor meters, and frequency meters. They are listed in standard commercial frequencies, but special ratings and scale markings can be obtained.

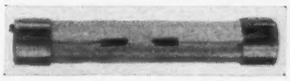
Both a.c. and d.c. instruments have electromagnetic damping.

Indicator, High-Voltage

The Martindale Electric Co., 1260 West 4th St., Cleveland, Ohio.

This device indicates whether a conductor is dead or alive by causing a sensitive neon discharge tube, which is equipped with special electrodes and assembled in a glass housing capped with brass ferrules, to glow at comparatively low voltages.

With voltages between 2,000



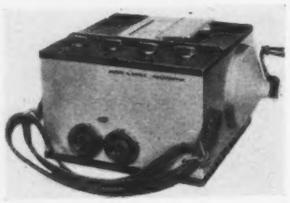
and 4,000 a ground connection is used and the tube is set in the looped end of a metal strap, which is in turn wrapped around additional micarta insulation placed on the conductor.

When used on conductors carrying a voltage above 4,000 no ground connection is used.

Tester, "Bridge-Meg" Resistance

James G. Biddle, 1211 Arch St., Philadelphia, Pa.

This instrument, called the "Bridge-Meg" Resistance Tester, combines in one unit facilities for making Wheatstone



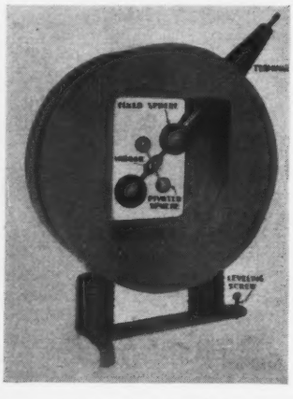
bridge measurements of conductor resistance at 250 volts, and also Megger tests of insulation resistance at 500 volts. It weighs 12¾ lb., and measures 7x8¾x12 in. It includes necessary dial resistances for bridge tests, a direct-reading ohmmeter for Megger tests, and a 500-volt d.c. constant-pressure hand generator for current supply. As a bridge it is operated in the same way as an ordinary Wheatstone bridge set except that instead of employing a battery, current at 250 volts is supplied by the hand generator, and the ohmmeter is used as a galvanometer for balancing.

The range of measurement covered is from 0.01 ohm up to 999,900 ohms and the Meg (or Megger) range is from 10,000 ohms up to 100 megohms. Direct reading is obtained by means of a pointer over a scale when connections are made and the handcrank is turned.

Voltmeter, Electro-Static

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

With this voltmeter the root mean square or the peak voltage may be measured, depending upon the method of connection to the service. It was designed for voltages up to 100,000, and operates on the



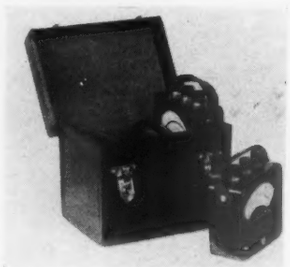
principle of repulsion of similar charges.

Fixed spheres mounted inside the coil, as shown in the illustration, are connected to the potential to be measured. The shaft of the pivoted spheres carries a galvanometer mirror from which a light beam is reflected on a calibrated scale conveniently mounted on a wall or other flat surface.

Instruments, Portable, D. C. Testing

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Each meter in this Type PX-4 line, is inclosed in a molded Micarta case 4½ x 4½ x 2 in. The meters operate on the D'Arsonval principle, and are intended to be used for general testing purposes where medi-

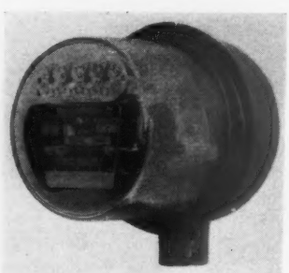


um-sized, light-weight instruments may be advantageously used. They are furnished in sets of three contained in a leather case.

Watthour Meter, OB Detachable

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

This instrument consists of the standard temperature-compensated OB watthour meter



housed in an iron-clad, weather- and tamper-proof case.

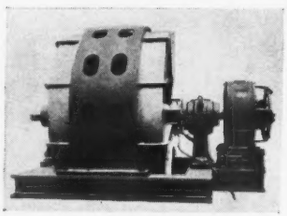
It is suitable for mounting either in or out of doors. By means of plug terminals the detachable meters may be connected or removed like radio tubes.

Motor and Generator Equipment

Generators, Fabricated, Horizontal

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Welded fabricated-steel construction replaces castings in stators, rotors, and bedplates



of horizontal generators for waterwheel drive.

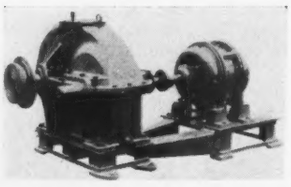
This unit is of the two-bearing coupled type and may be arranged for extended shaft for an overhung water wheel runner.

Several different rotor designs have been developed for high and for comparatively low peripheral speeds. The field poles are of thin steel laminations riveted together with overhanging pole tips to give support to the field windings.

Motor Beds, Welded-Steel

The Falk Corporation, Milwaukee, Wis.

By the addition of welded-steel motor beds, of the type illustrated, standard speed re-

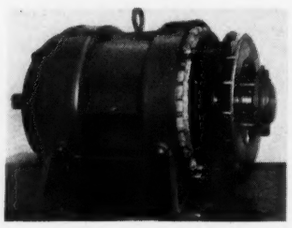


ducers made by this company may be had with a welded-steel or a cast-iron motor bed.

Motor, Fan-Cooled, Totally-Inclosed

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

In construction, this motor is almost identical with the standard open motor, yet it is intended for use in locations where service conditions are too severe to permit the use of a standard open motor. The



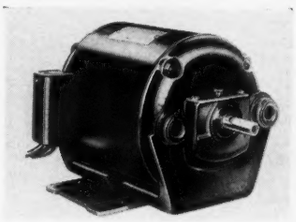
stators differ only in that the ends of the windings are inclosed in sheet-metal protective housings. The rotors are identical except for the addition of a machined collar mounted on either end of the shaft.

Circulation of the clean air sealed in the interior of the motor is maintained by blowers on the ends of the rotor, which transfer the heat generated in the windings to the protective housing where it is dissipated by the outside air.

Motor, Rubber-Mounted

Wagner Electric Corporation, St. Louis, Mo.

This rubber mounted motor is of the brush-lifting type, the brushes being lifted off the commutator as soon as the rotor attains operating speed.



It is completely insulated from the supporting cradle-shaped base by means of rubber bushings. This type of mounting has been effected without a change in overall length and width dimensions.

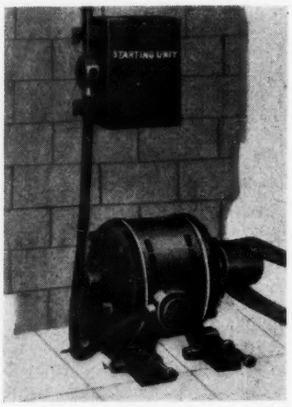
In addition to equipping the governor weights with rubber bumpers, as was done previously, the rocker arm has been redesigned to eliminate brush noises during starting and stopping.

Motor, "Brush-Less", Single-Phase, Type CI

Howell Electric Motors Co., Howell, Mich.

Although the Red Band, Type C1 (condenser start-induction run), single-phase motor has no brushes, commutator, wire-wound rotor, internal switching device, or soldered rotor contacts, it has, it is claimed, starting and pullout torques conforming to corresponding polyphase ratings as well as conforming power factors and efficiencies.

It can be plugged and re-

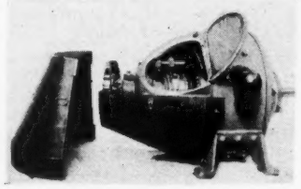


versed at full speed. Starting torque is supplied by an external starting unit containing the starting condenser and a simple contactor which automatically disconnects it from the circuit when the motor comes up to full speed.

Motor, Fan-Cooled, Type SK

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

In this redesigned motor, all mechanical parts, with the exception of the shaft, are inter-



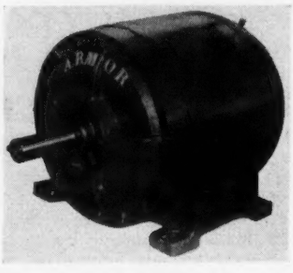
changeable with those parts used on the present totally-inclosed motor of the same frame size.

Essential mounting dimensions are the same as on the standard, open, Type SK motor of the same frame size. The commutator end of the motor is inclosed with a sheet-steel cover which has a perforated protective end through which the fan draws the cooling air.

Motors, Totally Inclosed, Explosion-Proof

The Armor Electric Manufacturing Co., Erie, Pa.

Squirrel-cage motors making up this line are suitable for



use under conditions where the atmosphere is liable to be impregnated with explosive fumes or abrasive dust. They are rated from ½ to 50 hp. at 550, 440, and 220 volts; two and three phase, 25 and 60 cycles.

End shields consist of solid castings with heavy external ribs supporting an external ring. Timken bearings are mounted between the caps bolted to the end shield proper. The caps have fine grooves on the inner surface into which grease is forced under pressure producing a dirt and gas-proof seal.

Motor, Type C, with Built-in Switch

Reynolds Electric Co., 2650 W. Congress St., Chicago, Ill.

A motor fitted with a built-in switch which facilitates easy starting and stopping.

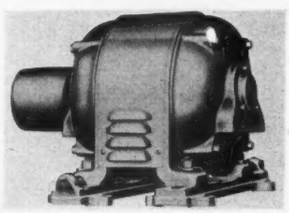
Although the motor is prac-

tically inclosed, it is adequately ventilated with a free circulation of air. Its size is limited to 1/20, ⅛, 1/6 and ¼ horsepower.

Motor, "Uniclosed"

U. S. Electrical Manufacturing Co., Los Angeles, Calif.

This motor represents an addition to this company's line of standard motor designs. The "Uniclosed" motor has a pressed-steel housing and although not totally inclosed,



offers the desired inclosing features.

It embodies a dual fan blast, auto-start principle, asbestos protection, solid die - cast aluminum rotor, and ball-bearing application.

This motor is recommended for use in locations where moisture and dripping water are ever present menaces to electrical equipment.

Welded Pedestals

The Production Equipment Co., Cleveland, Ohio.

To make a lighter, stronger job, and to render it easier to produce special heights and

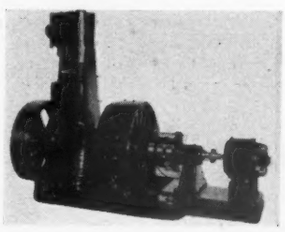
forms of pedestals when required, the above company is equipping its buffing, polishing and grinding motors with welded pedestals of the type shown.

All working parts are fully inclosed. The ball-bearings are of grease-packed, dust-proof design.

Generating Sets, A. C.

Engberg's Electrical and Mechanical Works, St. Joseph, Mich.

These sets are made in the direct-connected type with a direct-connected exciter, and



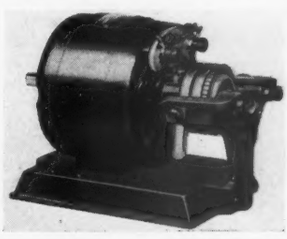
with a belted exciter for units from 20- to 75-kva. capacity.

Units from 51 to 183¾-kva. capacity have a stationary field. The larger machines have the revolving type of field.

Pole Changer, Motor-Driven

Bodine Electric Co., 2254 W. Ohio St., Chicago, Ill.

A device for converting direct current to alternating current



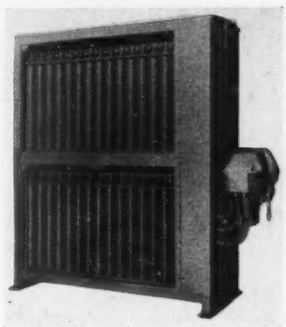
by reversing the direct current through a special commutator. Direct current is fed to the commutator through a pair of slip rings and the output is taken from brushes in contact with the commutator.

These units are made in capacities of 100 watts or higher.

Capacitor, Cell-Type

Electric Machinery Manufacturing Co., Minneapolis, Minn.

Individual capacitor rolls, the working element in the capacitor cell, are mounted on a supporting rack and sealed



under oil in the cell. Each cell is a capacitor unit; the total kva. required being obtained by the use of a suitable number of cells connected in parallel.

Motor, Turbo-Pump

U. S. Electrical Manufacturing Co., 200 E. Slauson Ave., Los Angeles, Calif.

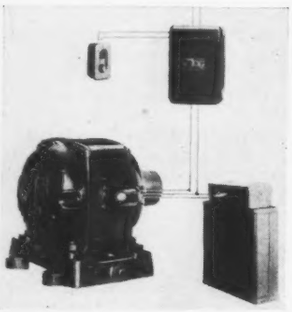
A motor housing designed as an integral part of the pump,

all operating parts of which are fully protected.

Motors, Single-Phase Capacitor

General Electric Co., Schenectady, N. Y.

Although this motor is classified as a single-phase machine it is a modified two-phase, squirrel-cage motor with a capacitor in series with one phase of the stator windings. They are designated Type KC, and rated from 1 to 25 hp.,



inclusive, at 3,600, 1,800, 1,200 and 900 r.p.m. constant speed, with starting torque from 60 to 40 per cent of full-load running torque depending upon the speed.

Painting Equipment

Spraying Machine, Portable

Atomister Corporation, Rahway, N. J.

Instantaneous control, light weight and even - pressure spraying are featured in the Model B Atomister, which

was designed to spray paint, lacquer, enamel, bronze, varnish, stain, shellac, white wash, insecticides and disinfectants.

Ease of spraying is obtained with a spray gun and container combined as a compact unit weighing 1 lb. A flexible hose connects the spray unit with the compressor which rests on the floor.

Cleaner, "Cramolin" Contact Surface

Cramolin, Inc., 25 W. 43rd St., New York, N. Y.

Cramolin is a liquid that is intended to be applied to all rubbing surfaces that conduct current; its purpose being to keep these surfaces clean and reduce the contact resistance.

Protective Covering, Opalite

Merritt Products Co., 1664 Wright St., Chicago, Ill.

A protective covering of a water-proofing, weather-proofing and rust-proofing nature that may be used on any surface.

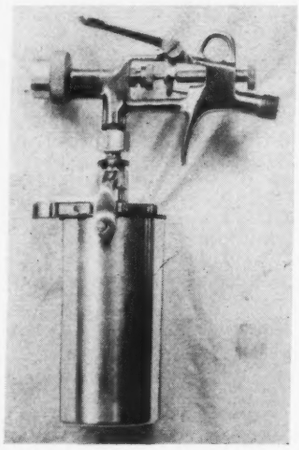
It is free from acids, coal tars or bi-sulphide products, and may be applied with a brush or a spray gun, drying in from 6 to 24 hours.

Spray Guns, Touch Up and Finishing

Binks Manufacturing Co., 3124 Carroll Ave., Chicago, Ill.

Off spray elimination features the two spray guns, Models 205 and 245, designed for general painting purposes.

In the model 205, which replaces the former standard



model 105, a self-centering nozzle is used to insure the even distribution of all paint solvents.

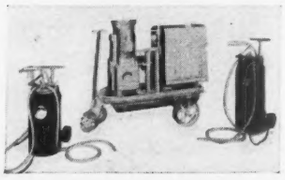
Improvements in the touch up and shading gun, Model 245, center in the nozzle head which is self adjusting.

Painting Unit, Portable

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago, Ill.

This unit can be used for light sand blasting and, in conjunction with the larger Paasche airbrushes such as Types UC and UD, for handling cement wash, asphaltum paints and other heavy materials.

Each unit is of sufficient capacity for 4 to 8 high-pressure or 8 to 15 low-pressure airbrushes. The unit consists of the Worthington air compressor of the hopper-cooled, feather-valve type and the Novo, two cylinder, radiator-cooled, roller-bearing engine with magneto ignition. The



unit is mounted on a reinforced, channel-iron chassis equipped with four wheels or skids as desired.

Paints

Joseph Dixon Crucible Co., Jersey City, N. J.

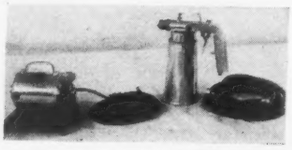
Several changes have been made in the line of paints manufactured by the above company. The range has been increased from 8 to 14 colors which include a straight aluminum paint, and a standard red oxide paint.

Utility paints have been added as standards, three of which are graphite-pigmented, the fourth pigmented with oxide of iron, and made in four standard colors. There are eight standard colors in the maintenance floor paints developed for the protection of wood, composition, linoleum and concrete floors.

Spray Gun, "Paint-O-Mister"

The Atomister Corporation, Rahway, N. J.

Air is by-passed through a port hole in the improved spray gun, known as the "Paint-O-Mister," when not spraying and the motor is run-



ning. Other features include a one-piece gun with pistol style grip, a spray volume regulating valve to increase or reduce volume being sprayed, a one-fluid jet for all materials, and an air nozzle for both round and flat spray adjusted by a half turn either way.

Spray-Painting Unit, All-Purpose

Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill.

This unit is intended for general utility work such as

touching up, refinishing, repainting, and lacquering. It is also adapted for the spraying of insecticides and disinfectants.

It is a complete unit equipped with a quart-size, all-metal container, and a Binks pressure-cup spray gun supplying an atomized flat spray four inches in width. The air compressor unit is belt driven from a ¼-hp. G. E. motor. This unit has a capacity of 2.16 cubic feet of air per minute.

Coatings, Insulating and Protecting

General Electric Co., Schenectady, N. Y.

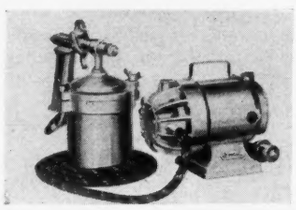
A series of lacquers in colors for use where an oil-resistant, highly-protective, durable and flexible insulating coating is demanded. The base of the lacquers is an alkyd resin produced from phthalic anhydride and glycerine marketed under the trade name "Glyptal."

These lacquers are available in five colors — red, blue, brown, green, and aluminum. They may be applied by brushing, spraying or dipping.

Paint Sprayer, "Tornado," Portable, Electric

The Breuer Electric Manufacturing Co., 852 Blackhawk St., Chicago, Ill.

Known as the "Tornado," this portable, electric paint sprayer is of the rotary compressor type, built of aluminum castings, equipped with a 1/3-hp. G. E. universal motor, and develops a pressure of over 35 lb. It is used for touch-up work, shading, light finishing, and refinishing jobs as well as



semi-production and maintenance work.

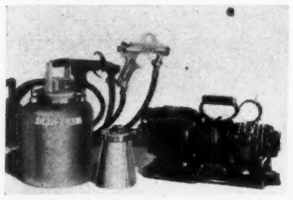
The gun is equipped with two tips, one slotted for fan spray and the other for narrow spray. An adjusting screw controls the amount of paint to be used.

Sprayit Unit, Portable, Electric

Electric Sprayit Co., 320 E. Colfax Ave., South Bend, Ind.

An all purpose, portable, electric, hand sprayer which has a pressure feed container, and which is suitable for covering wide surfaces, and for all types of commercial and production work that cannot be handled advantageously with a cup gun outfit.

A constant air volume of 5



cu. ft. per min., is produced by a rotary compressor of special design operated through a direct drive by a ¼-hp. motor. The pressure feed tank holds approximately 2 gal. of material, which will cover about 700 sq. ft. of surface. A one-quart container is also furnished and can be quickly connected to the gun for small touch-up and trimming jobs.

Emulsified Products

Headley Emulsified Products Co., Philadelphia, Pa.

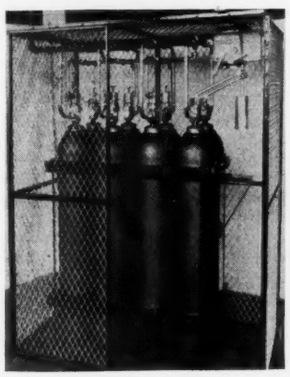
Waterproofing, dampproofing, and protective coatings for all types of structures, railroad platforms and crossings, and highway construction and maintenance are among the industrial uses included in the application of emulsified asphalt products.

Plant Service Equipment

Fire Extinguisher, Alfite System

The American-La France and Foamite Corporation, Industrial Fire Equipment Division, Utica, N. Y.

This Alfite system employs an inert gas known as Alfite gas confined in a liquid state in



metal cylinders 8½x51 in. under a pressure of from 900 to 1,000 lb. When the system is placed in operation a plunger ruptures a copper disk, used to seal the gas in the cylinder, and permits the gas to pass through piping to nozzles located at the fire.

The system may be operated manually, semi-automatically, or automatically.

Signal Service, "KodeKall"

The Schwarze Electric Co., Adrian, Mich.

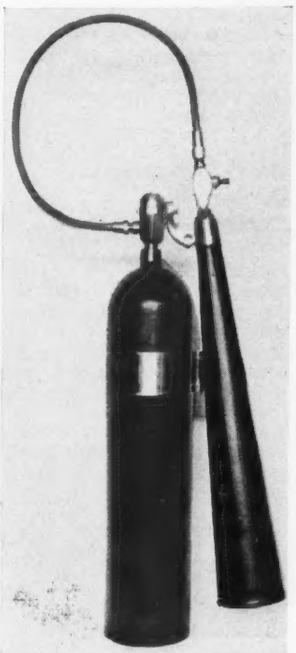
A device designated "Kodekall," designed to place distinct calls on bells or other

sound signal devices in industrial plants. It is a thirty-call, self-contained unit that is installed in accordance with any one of the four different systems devised for its use.

Extinguishers, Alfite, Portable, Hand

American-LaFrance and Foamite Corporation, Elmira, N. Y.

Both models in this line of portable, hand extinguishers in 7½- and 15-lb. sizes for extinguishing fires in gasoline, fuel, motor oils, paints, alcohol, and fires in electrical switchboards, are equipped with a cone-shaped horn which is designed to provide the maximum concentration of Alfite gas at the point of the



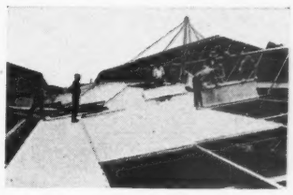
fire. The 15-lb. extinguisher is provided with a control valve which enables its operator to conserve the supply of gas while he is attacking the fire.

Roof Slabs, "Haydite" Precast

Federal Cement Tile Co., 608 S. Dearborn St., Chicago, Ill.

Material, known as "Haydite," is used as an aggregate instead of sand, gravel or stone in making roof slabs.

They are precast in the form as shown in the illustration. For extreme conditions

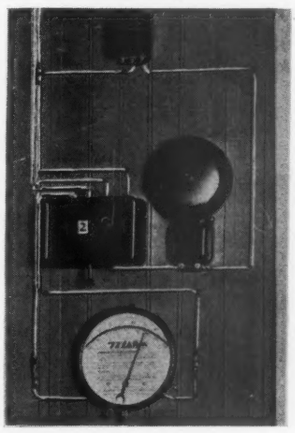


of heat and humidity it is possible to place a layer of additional insulating material over Haydite concrete roof deck.

Fire Alarm, "Telarm"

Lakeside Manufacturing Co., 440 W. Superior St., Chicago, Ill.

A fire alarm system, known as the "Telarm," which automatically transmits an alarm



whenever the surrounding temperature goes above or below any pre-determined degree.

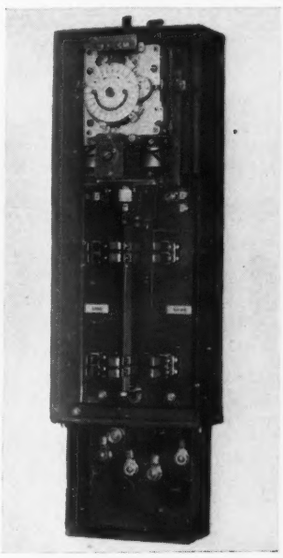
When the contacts are set on the high and low temperature limits, any change in the surrounding temperature will move the indicator hand and make contact, ringing a gong located in the circuit. Annunciators may also be used in addition to the gong. The system may be tested at any time by making contact between the movable contacts and the indicator hand. It may also be used for temperature control.

Time Switch, "Sauter" Self-Winding

R. W. Cramer & Co., 236 Liberty St., New York, N. Y.

Designated as the "Sauter," this single-throw, self-winding time switch is used to control blowers, pumps, ventilators and other electrical circuits that can be operated on a predetermined time basis.

Although the clock has a



four-day main-spring it is rewound automatically twice every 24 hours. The clock can be furnished with a Sunday cut-out, automatically causing the switch to suspend its functions every seventh day.

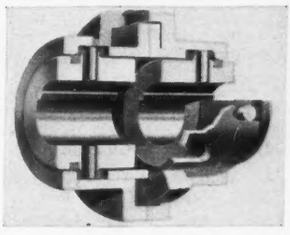
A single 24-hr. dial serves both for time setting and for program setting.

Power Transmission Equipment

Coupling, "Flex-Ring"

T. L. Smith Co., Milwaukee, Wis.

Designed to approach the universal joint with a shock absorber added, this full-floating coupling, known as the "Flex-Ring," compensates for prac-



tically all conditions in direct drive such as angular misalignment of shafts, offset between shafts, end-play of shafts and shock.

Torsional load is transmitted through one or more ring-shaped springs made of alloy steel. In a reversing drive it is not necessary to increase the size of the Flex-Ring since there is no reversal of stresses in the torque elements.

Drive, Herringbone-Gear Reduction

Gears and Forgings, Inc., Cleveland, Ohio.

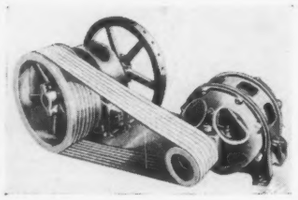
Designed for a peak load of 4,000-hp., this herringbone-gear reduction unit transmits power

from a 1,500-hp. a.c. motor operating at 360 r.p.m. to two stands of 28-in. bar mills. Two 8-ft. flywheels, each weighing 16,000 lb., are mounted on the pinion shaft to take care of the peak loads resulting from the mills. Timken tapered roller bearings are used on both the pinion and gear shafts.

"Cog" Belt

Webster Manufacturing Co., 1856 N. Kostner Ave., Chicago, Ill.

This belt derives its name from the series of tooth-shaped corrugations on its inner surface. The cog surface is not for the transmission of power, but to provide flexibility and to pre-



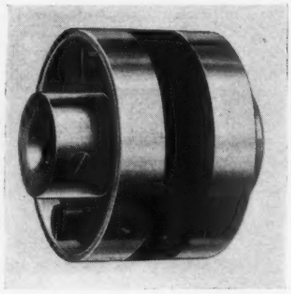
vent bucking when the belt is flexed around the pulley.

Although the belt is die-cut, not molded, the ends of the threads in these layers are exposed to the sides of the pulley groove to form a part of the driving surface, and because they are bias cut, it is impossible for them to ravel. They provide a tough, wear-resisting riding surface with a high coefficient of friction.

Coupling, Type C Flexible

The Ajax Flexible Coupling Co., Westfield, New York.

This Type "C," light-duty flex-



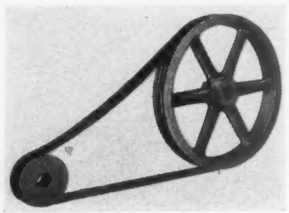
ible coupling is made of two die-cast flanges of identical diameter with wide faces and with the surfaces made true to the bore. The two flanges are connected by means of four set screws, two in each flange, screwed through the flanges and into four nuts which are permanently molded into a rubber center piece. This rubber disk acts as the shock-absorbing medium.

It is made in bores of from ½ to 1¼ in. for equipment requiring a great number of small horsepower couplings.

Drive, "Flex-Mor"

Fairbanks, Morse & Co., Chicago, Ill.

One of the recent developments in V-belt drives is known as the "Flex-Mor" Drive. The belts which are used with this drive are built up of an outer belt jacket of duck which has been treated with rubber to improve its wearing qualities. The various elements of the



belt are assembled in a mold and vulcanized together into a unified structure.

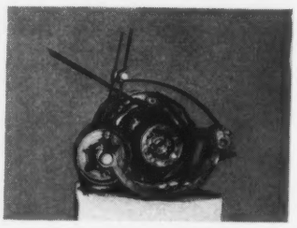
Owing to the wedging action of the belts in the sheave grooves and to their inherent elastic qualities there is no sudden grabbing of the load and sudden shocks to the driving and driven machine.

"Belt Slacker," Cantilever-Spring

Harry M. Perry, 638 N. Main St., Los Angeles, Calif.

This device, known as the "Belt-slacker," was developed to meet the drive condition wherein the slack belt is on the bottom.

Adjustable tension of the cantilever spring is provided by clamping it to a split sleeve which can be rotated on the



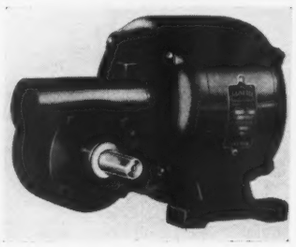
hinge bar and clamped in any position.

Beltslackers are equipped with Timken tapered roller bearings; with threaded axle for adjustment, and bronze adjustable split hinge bearings.

Speed Reducer, Motor-Driven

Janette Manufacturing Co., 556 W. Monroe St., Chicago, Ill.

This motor-driven speed reducer consists of a worm-and-gear reduction unit inclosed in a cast-iron housing which is bolted to a motor frame. The



flange of the gear casing forms the end frame of the motor.

Unit capacities range from 1/30 to ¼ hp., and with speed reductions ranging from 20 to 1 up to 50 to 1.

Standard gear ratios may be obtained as follows: 20, 26, 32, 34, 38, 40, 44, and 50 to 1. Special gear ratios will also be furnished.

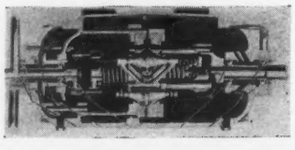
With a motor speed of 1,750 r.p.m. countershaft speeds are obtainable from 87.5 down to 35 revolutions per minute.

Speed Changer, JFS Variable

Stephens-Adamson Manufacturing Co., Aurora, Ill.

All sizes and types of JFS Variable Reducer Transmission devices have been equipped with five ball bearings in each frame. There are two ball bearings supporting the high-speed shaft, and two supporting the variable-speed shaft.

Internal circulation of the oil bath is accomplished through the actual splashing of the revolving parts.

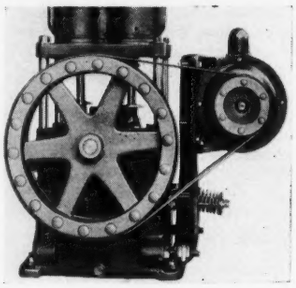


Drive Unit, "Uni-Pull"

The Rockwood Manufacturing Co., Indianapolis, Ind.

This device may be used on a single machine or a line-shaft group. It may be mounted on the floor, on the machine, on a platform, or suspended from the ceiling.

As a unit, it consists of an electric motor, an ordinary flat belt and two standard paper pulleys. The motor is mounted



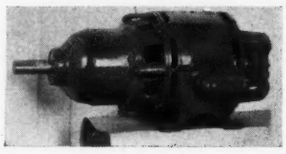
on a free-moving pivot in order that its gravity weight may automatically maintain the belt tension necessary to insure a uniform flow of power at all times.

Speed Changers, Types C and S

Crocker-Wheeler Electric Manufacturing Co., Ampere, N. J.

These speed changes were introduced to the American market under the Garrard patents. The type of gear is a complete departure from previous practice in that power is transmitted by hardened steel cylindrical surfaces accurately ground to size and pressed together by means which automatically increase the pressure as the load increases.

As a reducer the Type C gear is designed for ratios between 1½ to 1 and 10 to 1.



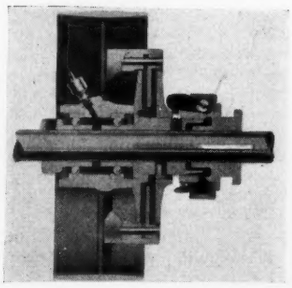
As an increasor, for ratios between 1 and 1½, and 1 to 4. The standard gear may be inverted for ceiling mounting.

The S-type gear is a development of the planetary gear system, but hardened steel rollers and rings are used instead of the sun and planet tooth gears. It is made as a reducer with ratios between 3 to 1 and 10 to 1. Each type possesses different mounting arrangements.

Clutch, Type "SF" Disk

The Edgemont Machine Co., Dayton, Ohio.

Renewable asbestos metallic liners of large friction area are



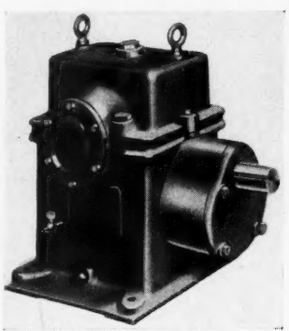
employed in this Type "SF" disk clutch, which is provided with a single adjustment.

It is intended for a variety of applications ranging from counter-shaft installations to machine applications where either low or high speeds are transmitted.

Speed Reducers, Type HGX Worm-Gear

Foote Bros. Gear and Machine Co., 215 N. Curtis St., Chicago, Ill.

Intermediate between the HGS single-reduction unit and the HGD double-reduction unit is the HGX Type of anti-friction, worm-gear, speed reducers in the Hygrade line. The HGX provides higher reduction ratios than standard ratios listed



for the HGS reducer and still maintain the right-angle drive where ratios higher than single-reduction ratios are desired.

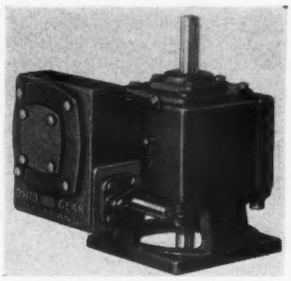
It consists of a standard, single-reduction worm reducer with a set of helical gears mounted on the worm shaft. The high-speed element consists of a set of wide-faced helical gears having a maximum ratio of 4 to 1. The maximum motor speed which can be applied to the high-speed shaft of this unit is 4,000 r.p.m. Ratios adopted as standard for the helical gears or high-speed end of this unit are 1 to 1, 2 to 1, 3 to 1, and 4 to 1, which is the maximum reduction.

Speed Reducers, Double-Reduction

The Ohio Gear Co., 1333 East 179th St., Cleveland, Ohio.

These speed reducers have hardened and ground worms. The bronze worm wheels are equipped throughout with Timken roller bearings.

As with the single-reduction

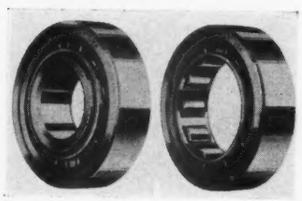


units, many different ratios are available, the limit being 24,000 to 1, and in torque capacities varying from 100 to 3,200 inch-pounds.

Bearings, Single-Row Radial

Hyatt Roller Bearing Co., Newark, N. J.

This line of bearings made up of solid rollers is not intended to replace the standard Hyatt roller bearing which uses



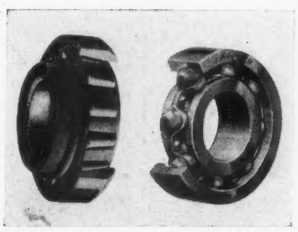
spirally wound rollers, but is offered as a supplement to it, for positions in which space limitations exist, and where loads beyond the capacity of ball bearings must be sustained.

In the bearing the rollers are permanently retained with the outer race, the inner race being separable. A separator floating on the rollers spaces them properly, and heat-treated end rings retain them endwise within the outer race.

Ball Bearings, Single-Row Annular

Hoover Steel Ball Co., Ann Arbor, Mich.

This line of single-row, annular ball bearings introduced in standard sizes by the above company is of deep-groove, no-notch construction to with-



stand heavy thrust and radial loads at high speeds.

They are made in the 200, 300 and 400 series, which are for light,- medium-, and heavy-duty service.

Coupling, Flexible

American Flexible Coupling Co., Erie, Pa.

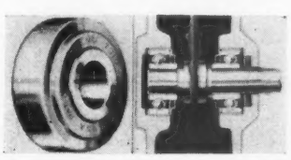
This shaft coupling is a variation of the Oldham design in which a center member is constrained to slide across the face of one coupling flange on a line passing through the center and, at the same time, is free to slide across the face of the second flange in a direction at right angles to the first.

The flange sections are identical and interchangeable, except for the bore diameters which are made to suit the shafts. The flange is cast in one piece with a hub of ample dimensions. A wide groove is machined in the face of the flange, leaving two jaws between which the floating member slides and by which the torque is transmitted. The coupling can be removed without the use of special tools by pulling the jaw flanges apart horizontally or sliding them past each other vertically.

Bearing, N-D Seal

New Departure Manufacturing Co., Bristol, Conn.

This self-sealed, self-lubricated ball bearing, known as the N-D Seal bearing, is made only in the smaller sizes and consists of what is essentially a New Departure single-row ball bearing of the non-loading groove



type, permanently fitted into a metal-case or shell.

This shell is shaped on one side of the bearing so as to contain a felt closure which fits over the ground outside diameter of the extended bearing inner ring, forming a seal both for the retention of lubricant and the exclusion of dirt.

Outside diameters and bores are standard. The capacity characteristics of N-D Seal bearings are substantially the same as corresponding sizes of non-loading, groove, single-row bearings.

Roller Chain, 2½-In. Pitch

Diamond Chain and Manufacturing Co., Indianapolis, Ind.

Although this chain is similar to all Diamond roller chain it was designed for heavy-duty applications such as large conveyors, industrial locomotives,

and so on. It is made in single and multiple strands, transmission capacity and tensile strength being proportional to the number of strands.

Belt, Compass Endless-Cord

Goodyear Tire and Rubber Co., Inc., Akron, Ohio.

A transmission belt differing from the ordinary fabric belts in that it has no splice in the core of cords which carry the load. The cords are imbedded in rubber and covered by an

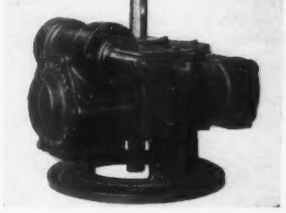
elastic, rubberized, fabric envelope.

It is recommended for use on equipment such as air compressors, vacuum pumps, rock drills, ice machines, and other high-speed, small pulley drives.

Speed Reducer, Compound Worm-Type

Boston Gear Works Sales Co., Norfolk Downs, Quincy, Mass.

A series of compound vertical speed reducers, known as Type "V-W," made in four sizes to



accommodate very high reductions.

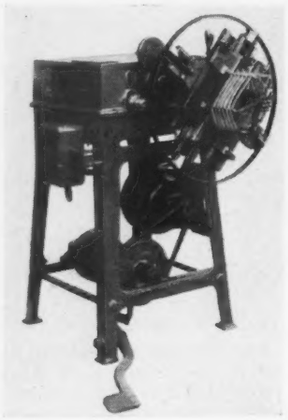
It is capable of reductions up to 4,000 to 1. They are equipped throughout with tapered roller bearings to take care of the thrust.

Shop Tools and Materials

Coil Winding Head

The Mutual Foundry & Machine Co., Atlanta, Ga.

With this head, coils can be wound singly or in groups of two, three, four or six; or it is possible to wind three sets



of two coils, one set of four or six groups. The lead holding device will hold up to four wires at a time and can be placed in any desired position on the head.

Six independently adjustable points of contact permit winding practically any shape of armature coil with size variations ranging from 4½ in. in length and 2¼-in. span to 20 in. in length with 14-in. span. Special attachments can be supplied for winding coils of a wide variety of sizes and shapes.

A simple method is provided for contracting the fingers giving ½-in. clearance for removing coils.

Offset Keystock

Rockwood Manufacturing Co., Indianapolis, Ind.

With an assortment of offset keystock, made by the above company, any millwright or mechanic can mount pulleys, sprockets, couplings and gears quickly and economically regardless of keyseat variations.

Twenty-three stock sizes are available, assuring wide interchangeability of pulleys and gears for any given shaft diameter.

Reamer, Spiral Groove

The Morse Twist Drill & Machine Co., New Bedford, Mass.

This spiral, three-groove reamer was designed to have a large chip area, double-cleared, and a cutting edge that gives a shearing cut with graduated taper. It can be used for boiler or other work that requires aligning or enlarging holes in plate or structural steel.

Grinders, Motor-Driven

Peerless Electric Co., Warren, Ohio.

In this line of ¼-hp. motor-driven grinders, one is a portable type. The others are either pedestal mounted, ceiling mounted, or mounted on overhead trolleys. A flexible shaft provides power for the variety

of grinding, buffing, sanding and rasping operations.

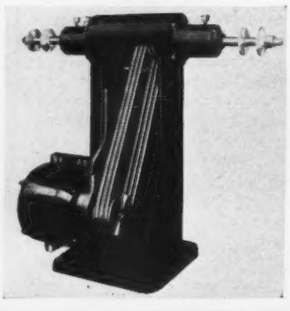
Totally-inclosed motors are used. On the pedestal type the motor is mounted on a swivel that turns in a horizontal plane.

Lathe, "RiteSpeed" Electric Polishing and Buffing

Hill-Curtis Co., Kalamazoo, Mich.

This electrically-driven polishing and buffing lathe, known as the "Rite-Speed," is suitable for a wide range of work requiring maximum working room for two operators.

It has a spindle 80 in. over all, which is driven by means of a Multi-V Texrope from a 40-deg. motor equipped with a Hill-Curtis air cleaner mounted on the back of the pedestal.

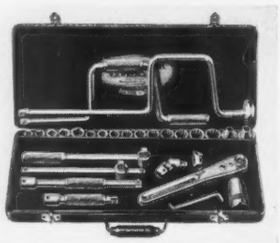


Wrench Sets

Blackhawk Manufacturing Co., Milwaukee, Wis.

The "Chief" sets added to the regular line include double hexagon sockets, and sockets that are quickly detachable or securely locked on the handle.

Set No. 30 CD, illustrated, contains 30 handles, attachments, and sockets. Set No. 16 CD contains 16 tools. The

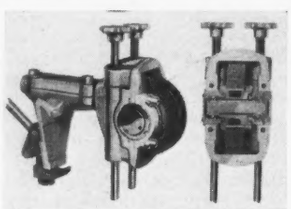


third set, No. 26 KD, is a combination of the tools from No. 16 CD and ten open-end wrenches.

Truing Tool

Ross Manufacturing Co., Cleveland, Ohio.

Hub design of this tool is a departure from previous ball-bearing types in that it permits the inner, instead of the outer races to revolve. One bearing is fixed while the other floats. Wide bearing centers reduce the leverage of the thrust loads of the grinding wheel, prevent-



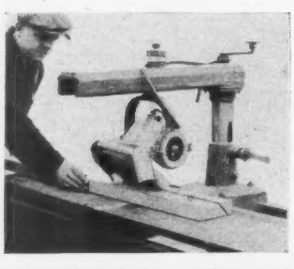
ing "rocking" of the dresser wheel while in operation.

It has two adjustable steady-rests, giving three-point support and enabling the tool to be tilted to any desired shearing angle.

Electric Saw, "Wonder-worker"

De Walt Products Corporation, Leola, Pa.

Changing from cross-cutting to ripping without stopping the



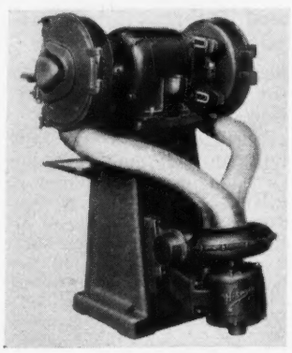
motor is a feature incorporated in the electrically-driven saw shown. Standard equipment includes an adjustable guard, a ripping gage and dials for adjustment to any position, and a 12-in. combination cross-cut and rip saw.

It will handle cutting operations including dadoeing, routing, mitering, shaping, grooving, etc. The driving medium is a 110-volt universal motor taking power from the lighting circuit.

Exhauster

The Hisey-Wolf Machine Co., Cincinnati, Ohio.

The accompanying illustration shows the motor-driven, ball-bearing exhauster developed for 10-, 12-, and 14-in. grinders



made by this firm. One starter is used to control the grinder and exhauster motor simultaneously. Exhauster equipment can be furnished also for the buffing and polishing machines of 8-, 10-, 12-, and 14-in. wheel capacity.

Insulation Remover, Motor-Driven

Electric Service Supplies Co., 17th and Cambria Sts., Philadelphia, Pa.

This device, known as the Type KP Peerless insulation remover, was designed to remove

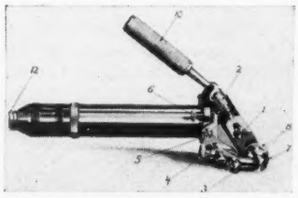
insulation without damage to the wire. The pressure required to force the wire against the revolving brush is controlled by means of the foot-operated treadle. The machine is self-

contained. The principal overall dimensions are 44½ in. high and 19 in. wide. Driving motors are furnished for either a.c. or d.c. service.

Mica Undercutter, Power

Ideal Commutator Dresser Co., Park Ave., Sycamore, Ill.

This complete unit which is driven by a ½-hp. a.c. or d.c.

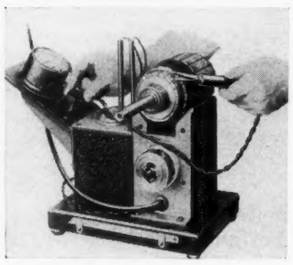


motor, consists of undercutter head and two wrenches, four V-type milling cutters or eight, high-speed steel saws.

Growler, Universal

Allen Electric & Equipment Co., Kalamazoo, Mich.

This device was developed for testing armatures up to 6-in. in diameter. An adjustable rheostat controls the meter current to compensate for different



kinds and sizes of armatures. The contact arms are adjustable to permit testing any armature. Current up to 8 amp. can be carried by the test points for blowing out, or detecting by smoke, any ordinary ground.

Lathe, Repair Shop

Allen Electric & Equipment Co., Kalamazoo, Mich.

This small lathe was developed for turning commutators and other maintenance and repair

work except screw cutting. Its capacity is 24 in. between centers.

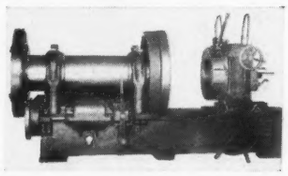
A three-cone pulley makes possible a considerable range of speed.

Pipe Threading Machine, Duplex

Bignall & Keeler Machine Works of the N. O. Nelson Manufacturing Co., Edwardsville, Ill.

Designated as No. 12, this duplex pipe threading and cutting machine has a capacity ranging from 4-in. pipe to 13⅜-in. A.P.I. casing.

Eight speed changes are provided through gears running in oil in a compact gear box with one set of gears outside the gear box. A two-way positive

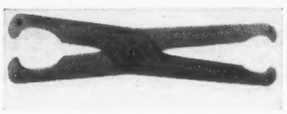


clutch is mounted on the bed shaft. This clutch has both fast and slow positions and provides a quick stop and start for the machine, and also enables the operator to shift quickly to the higher speed for cutting off operation on large pipe sizes.

Fuse Pullers

Ideal Commutator Dresser Co., Sycamore, Ill.

These tools are made in four sizes: The Midget, with three laminations, 5 in. long, and with gripping jaws at one end only. This model is for use on small fuses of from ¼ to ½ in. in diameter. The Pocket size,

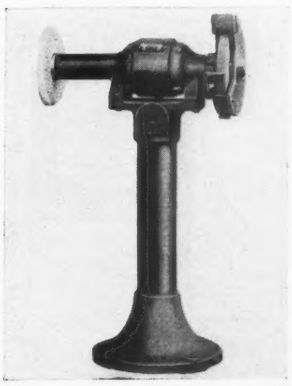


made with five laminations is 7½ in. long and can be used for handling fuses of from 0 to 200 amp., 250 volts and from 0 to 100 amp., 600 volts. The Giant size, 12 in. long and with seven laminations is for handling fuses of from 100 to 400 amp., 250 volts and from 60 to 400 amp., 600 volts. The largest size, known as the Jumbo, is 20 in. long.

Grinders, Buffers and Polishers, Ball-Bearing

Sterling Electric Motors, Inc., Telegraph Rd. at Atlantic Blvd., Los Angeles, Calif.

These inclosed, ball-bearing, air-cooled buffers, grinders and

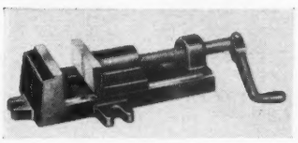


polishers are made in floor pedestal and bench types with motor capacities ranging from ½ to 5 hp. Motors can be obtained in the single-phase type for 110 or 220 volts and in the two- and three-phase types for use on 220 or 440 volts.

Vise, Drill-Press

Automotive Maintenance Machinery Co., 816 W. Washington St., Chicago, Ill.

The jaws of this tool are machined to provide a positive grip on the material being drilled. A V-shaped slot in the



movable jaw furnishes a rigid support for all vertical work. The handle is swiveled, which permits the use of the vise in positions which would otherwise be extremely awkward or impossible. The jaws are 3½ in. wide and 1½ in. deep and open to admit work 4½ in. wide.

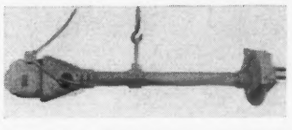
Grinder, Swing Frame

Kinney Iron Works, Santa Fe Ave. at 28th St., Los Angeles, Calif.

This swing frame grinder may be hung from an ordinary chain block.

Both ends of the grinder shaft are mounted in heavy dust-sealed ball bearings with a double row of balls. The length of the complete unit (without handles) is 7 ft. 9 in. over all.

The wheel runs at right angles to the frame which allows the operator to see his work at all times. The wheel guard may easily be rotated so that either side of the wheel is exposed.

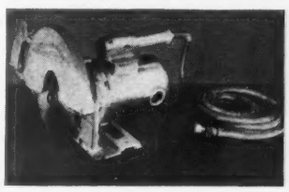


Saw, Motor-Driven Hand

Electric Hand Saw Co., Seattle, Wash.

Either ripping or cross-cutting operations may be performed with this motor-driven hand saw. It may be used free-hand or with a miter box, or a saw table.

It is powered with a 4/10-hp. motor and has a free running



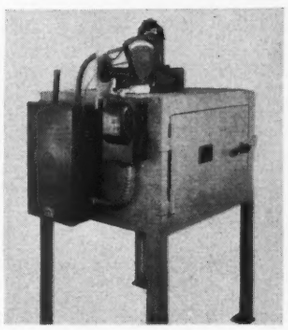
speed of 2,707 r.p.m., or a peripheral saw speed of 4,737 f.p.m. The frame and sawguard are made of aluminum.

Oven, Type AD Air-Drawing

General Electric Co., Schenectady, N. Y.

Any temperature up to 750 deg. F. can be obtained in the Type AD air-drawing oven. Only 0.9 kw. is required to maintain a temperature of 500 deg. F., and where the oven is in daily use, but 25 minutes are required to reach this temperature.

Temperature control is fully automatic, consisting of an in-

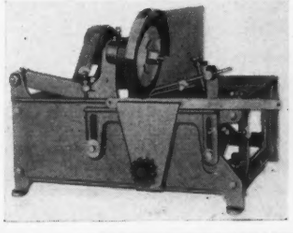


closed contactor panel and a controller. The normal rating of the oven is 5 kw., and its capacity at 500 deg F. is 100 lb. per hour.

Grinder, Automatic Saw

Foley Saw Tool Co., Inc., Minneapolis, Minn.

Metal cutting saws of all sizes up to ⅝-in. spacing may be



ground and automatically jointed with this automatic saw grinder. It is used for resharpening all high-speed hack saw blades and metal-cutting band saws, ¼ in. or wider. The speed of grinding is 70 teeth per minute.

This machine, which is known as Model G-109, is 25 in. wide, 19 in. deep, and 18 in. high. It is driven by a ¼-hp. motor, with thermostatic switch control to prevent overloading.

Grinder, 6-In.

United States Electrical Tool Co., Cincinnati, Ohio.

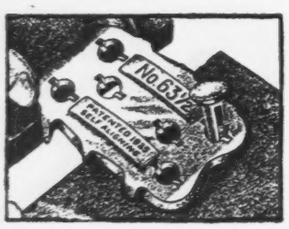
Ball bearings, a heavy nickel steel spindle, a ¼-hp. motor operating at 3,450 r.p.m. load

speed, and a fine and a coarse wheel, 6 x ½ x ½ in. are embodied in this 6-in. grinder. Adjustable tool rests and complete electrical connections are also standard equipment.

Belt Fastener, "Self-Aligning"

The Bourne-Fuller Co., Upson Works, Unionville, Conn.

This belt fastener, known as the "Self Aligning," consists of rust-proof plates and rivets which are aligned lengthwise of



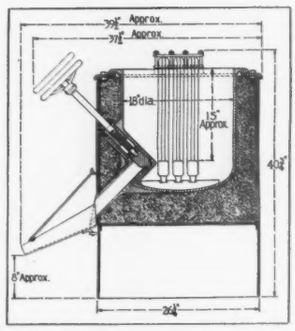
the belt by means of projections in the rivet holes guiding the rivets lengthwise of the belt.

Self-aligning belt fasteners are standardized to 6 sizes of plates and 9 lengths of rivets to fasten 2- to 8-ply transmission to 10-ply conveyor belts.

Melting Pot, Bottom-Pouring

General Electric Co., Schenectady, N. Y.

Designated as Type RP, Form F, this electric metal-melting pot with a bottom pouring spout is adaptable for use in the printing industry for the



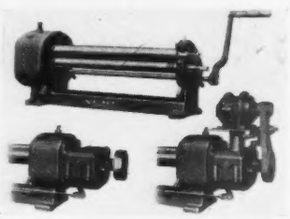
resmelting and repigging of type metal, and in railway shops and automotive plants for the casting of babbitt bearings.

Former, Sheet-Metal Slip Roll

Niagara Machine and Tool Works, Buffalo, N. Y.

This roll former is intended for the forming of sheet metal in cylindrical shapes.

It is 3 in. in diameter, and



of geared construction arranged with the top roll pivoted.

All three sizes can be arranged for hand operation, pulley drive or belted-motor drive.

Hacksaw Frame, No. 4, "Bon Ton"

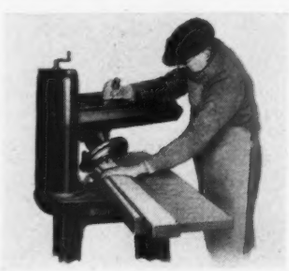
Forsberg Manufacturing Co., Bridgeport, Conn.

Equipped with a tight-grip handle, this No. 4 "Bon-Ton" hacksaw frame is adjustable for 8- or 12-in. blades and is 3⅜ in. deep.

Radial Saw, Electrically-Driven "Workace"

J. D. Wallace & Co., Chicago, Ill.

A portable, electrically-driven radial saw, designated as the "Workace," which is easily adjusted to cut at any angle,



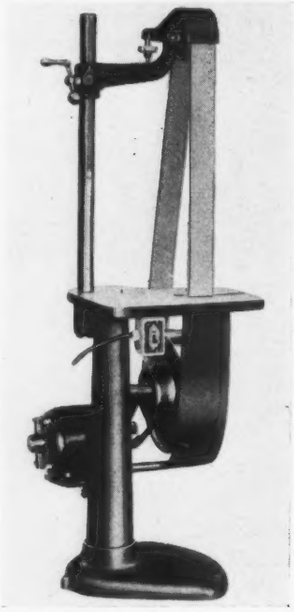
and which may be used for cross cutting or ripping, dadoing or grooving, rabbeting, routing, panel raising, shaping, sanding, and many other operations.

With an 8-in. blade it cuts 2½ in. deep; a 9-in. blade cuts 3 in. deep. The saw travels 19½ in. in the arm and is adjustable vertically 5¾ inches.

Belt Sander, "Syracuse" Type B6, Flexible

The Porter-Cable Machine Co., Syracuse, N. Y.

A device designated as the "Syracuse" Type B6, adapted for sanding small irregularly



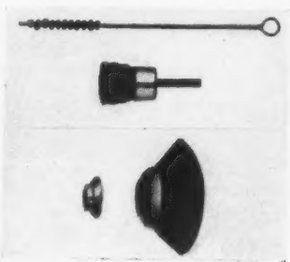
shaped articles, and which consists of a small pedestal and work table through which an abrasive belt runs vertically.

This type is motor-driven, power being transmitted by means of a belt. It can be equipped for two speeds; 1,975 f.p.m. for wood, or 3,425 f.p.m. for metal.

Brushes, Cup and End

Specialty Manufacturing Co., 10698 Berea Road, Cleveland, Ohio.

Three cup and end brushes were developed for the purpose



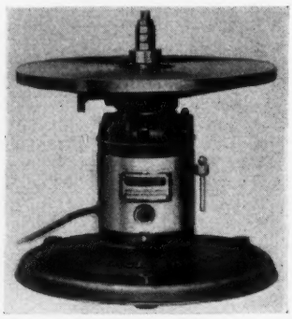
of cleaning interiors of tanks, barrels, boilers, tubes, castings, and for other maintenance and production jobs where the ordinary circular brush is not effective.

They may be used either on a polishing spindle or in conjunction with flexible shaft equipment, and may be made up into gangs for any desired shape of brush surface.

Shaper, "Workace," Portable, Motor-Driven

J. D. Wallace & Co., 134 S. California Ave., Chicago, Ill.

This machine, known as the "Workace," is direct motor



driven with the armature shaft.

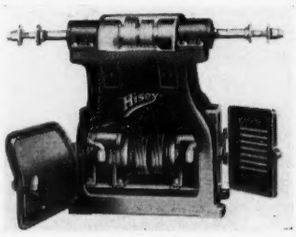
It has a no load speed of 10,000 r.p.m. The table is mounted on a screw on which it may be raised or lowered and locked in position by means of a handwheel.

With a ⅝-in. spindle, extending 3⅝ in. above the table top, it has a capacity of 2½ in. between two steel shaper collars, or 3¼ in. using solid cutters.

Buffer, Dual-Motored Tex-Drive

The Hisey-Wolf Machine Co., Cincinnati, Ohio.

Two separate and distinct spindles, each operated by its own motor are embodied in this



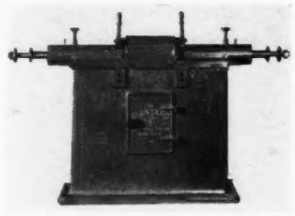
dual-motored Tex-Drive buffer.

It is made in two styles; with single-motor drive, and with dual-motor drive.

Buffer and Polisher, Standard, Right Speed, Two-Motor

The Standard Electrical Tool Co., Cincinnati, Ohio.

This machine is made in 3-, 5-, and 7½-hp. sizes. Any speed from 2,000 to 3,000 r.p.m.



can be obtained by changing pulleys on the motor shaft.

Each machine is powered with G. E. 40-deg. ball bearing motors, mounted in the base, and equipped with an independent push-button control. A hinged base plate that takes the motor has an adjustable screw to take up the tension of the Dayton Cog Belts which run in V-grooved, cast-iron pulleys.

Lathe, Polishing and Buffing, "Rite Speed"

Hill-Curtis Co., Kalamazoo, Mich.

A motor-in-base polishing and buffing lathe in which power is transmitted from the motor

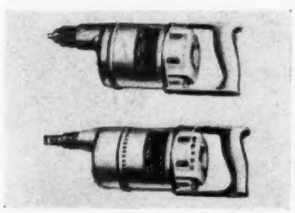
to the spindle by means of a Multi-V type belt.

An automatic starter with overload protection is standard equipment. A combination switch and brake feature is incorporated in all "Rite Speed" polishing machines.

Tools, Portable, Electric

The Schauer Machine Co., Cincinnati, Ohio.

Two portable electric tools are featured by the above com-



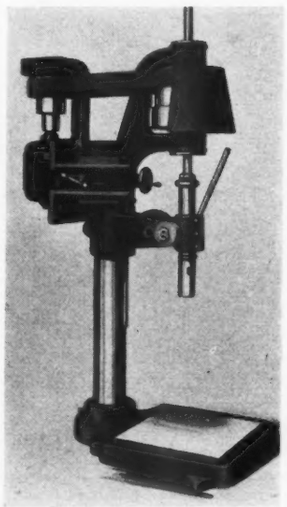
pany: A quarter-inch drill; and a screwdriver, as illustrated.

Both tools employ the same type of motor. The screwdriver is equipped with a screw-slot finder and finder bit, but it can be operated without the finder if necessary, or with the socket bit for nut tightening.

Drills, 16-In. Sensitive

The Buffalo Forge Co., Buffalo, N. Y.

These devices will drill 5/8- to 7/8-in. holes in cast iron. The head has a travel of 8½ in. They are equipped with SKF



ball bearings, and are made in floor and bench types.

Three spindle speeds are provided: 418, 835, and 1,725 r.p.m. A hand lever feed is provided on the bench type, and a hand lever and foot treadle are provided for speeds and convenience in the floor type.

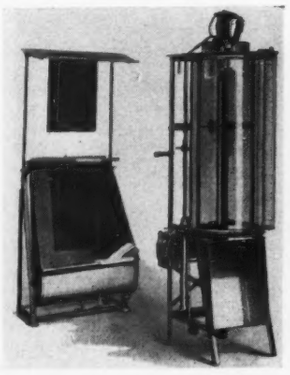
Blue Printing Machine and Sheet Washer, Junior

C. F. Pease Co., 813 N. Franklin St., Chicago, Ill.

Blue prints of any size up to 24 x 36 in. can be turned out in from 1 to 1½ min. with one drop of the lamp in this Junior blue printing machine.

A floor space of 22x26 in. is required for the blue printing machine, and 24x34 in. will accommodate the sheet washer.

Both units are intended for



use in drafting rooms where only a small quantity of blue prints is required or where emergency prints are wanted in a hurry.

Tie Binder, Metal, Type "TA"

The Gerrard Co., Inc., 1942 S. 52nd Ave., Chicago, Ill.

A metal tie binder in which wire is looped around a package, threaded through the ma-

chine, and tied with one throw of the lever forward and backward.

Lathe, "Rite Speed," Polishing and Buffing

Hill-Curtis Co., Kalamazoo, Mich.

There is a clearance of 12½ in. from the spindle housing to the front of the pedestal, at the floor, to allow maximum working clearance around the

spindle of this electrically-driven polishing and buffing lathe.

Like all "Rite Speeds," this machine transmits the power from the motor to the spindle by means of Multi-V belts which require no idler to prevent slippage

Cleaning Brush, Air-Operated

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago, Ill.

A device consisting of a circular steel wire brush driven by an air motor, and which is recommended for use in connection with all air painting equipment where the cleaning of surfaces before painting has always been a problem.

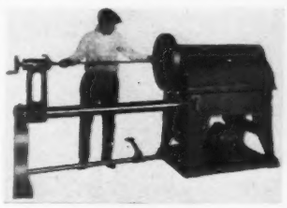
Brushes are made in two sizes; 4 in. in diameter by 3¼-in. face, and 6 in. in diameter by 1-in. face.

Coil Winders, Heavy-Duty

Mutual Foundry & Machine Co., Atlanta, Ga.

This group of heavy-duty field and transformer winders includes three models.

Type FB, illustrated, has a swing of 30 in. in diameter over the tail stock bar, and will accommodate lengths up to 48 in. between centers. Type FC is similar to type FB, but is suitable for face-plate work only. A 24-in. face plate is standard equipment, having 4 T-slots and 4 open slots for 5/8-in. bolts. Type FA is es-

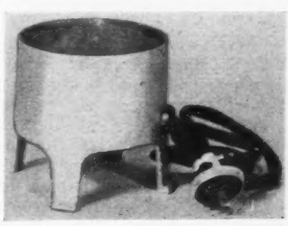


sentially the same as the models described, but owing to its low bed, it has a swing of 72 in. All models are equipped with Dodge, Timken, SKF and Hyatt bearings throughout.

Tinning Pot, Single-Heat

Harold E. Trent Co., 439 N. 12th St., Philadelphia, Pa.

Made only in the single-heat type for 110-volt circuits, the tinning pot shown in the illus-



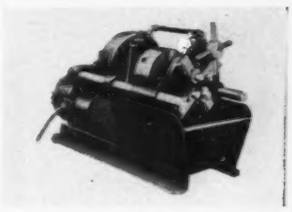
tration has an energy consumption of 355 watts.

The inside dimensions are 4 in. in diameter by ½ in. deep.

Pipe Threader, Power-Driven

Toledo Pipe Threading Machine Co., Toledo, Ohio.

Power is transmitted from a ½-hp., 110-volt universal motor



through direct gear drives in this portable, power-driven pipe threading machine designated as the Toledo No. 999, which was designed for cutting and threading from ½- to 2-in. diameter pipe.

Net weight of stripped machine for carrying is 265 lb. It occupies a space 32x16 in. on a bench and is only 20 in. high.

Buffer and Polisher, Multi-Speed

United States Electrical Tool Co., Cincinnati, Ohio.

A buffer with a variable speed range for all polishing and burnishing jobs, made in four sizes; 1, 2, 3, and 5 hp., for

use on 220-, 440-, and 550-volt, two- or three-phase, 25-, 40-, 50-, and 60-cycle a.c. service.

Power at the different speeds is transmitted by means of a Gibbs V-disk transmission of graphitized micarta. A cone or series of different sized disks revolve on the motor spindle.

"Konel" Metal

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

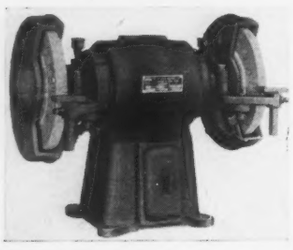
A metal credited with being much stronger than other metals at high temperatures and which can be used extensively in the moving parts of internal combustion engines and other extremely hot places.

It is found to be harder to forge than steel and to be very tough at high temperatures when most metals lose their strength.

Grinder, 1-hp. Bench

The Schauer Machine Co., Cincinnati, Ohio.

Solid-race, double-row ball bearings are used in this 1-hp. bench grinder, which is adaptable for general shop use. The



height from the base of the grinder to the center of the wheel is 11 inches.

Wheels, 10 x 1 in., are used, running at 2,000 r.p.m. on direct current, and 1,750 r.p.m. on alternating current.

Babbitting Machines, Centrifugal

Manufacturers' Consulting Engineers, 487 S. Salina St., Syracuse, N. Y.

Floor space occupied by the 8-, 12-, and 18-in. centrifugal babbitting machines making up

this line is 30 x 30 in., 30 x 36 in., and 30 x 48 in., respectively.

In each unit the motor is built-in and is accessible through a large opening in the back of the base. Ball bearings are used on the spindle pulley. Belt tension is maintained by a spring-type, roller-bearing idler pulley. A cone-type clutch drives the spindle which is stopped by disengaging the clutch from the spindle pulley and engaging the other side of the clutch with a stationary brake drum.

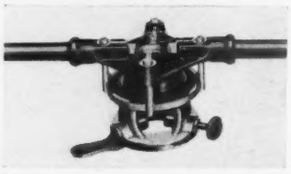
Pipe Threader, "Leader"

The Oster Manufacturing Co., Cleveland, Ohio.

The universal guides that automatically center the pipe features this pipe threader, designated as "Leader," and which threads and cuts pipe from 1 to 2 in. in diameter.

It is made up in two types: No. 1, a plain tool without the ratchet device feature; and No. 1A, with the ratchet construction.

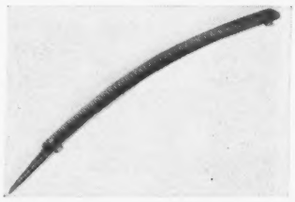
On the ratchet-type tool, the ratchet can be set for forward or reverse or can be locked for use as a plain tool by a turn of a control wheel.



File, "Truarc" Flexible

Filecraft, Inc., 3450 Hamilton Ave., Cleveland, Ohio.

It is possible to adjust this file to any desired convexity of filing service. The file consists of two parts: The flexible reversible blade which carries teeth on both sides, and a bolt hole in each end; and the stiff back to which the blades are bolted. This back may be

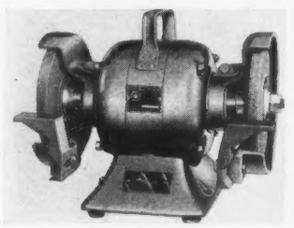


either supplied curved to the required degree or may be readily made by heating and bending one of the regular straight backs used for the regular "Truarc" backed files.

Bench Grinder, Portable 6-In.

Black & Decker Manufacturing Co., Towson, Md.

Anti-friction bearings are used in this 6-in. ball bearing port-



able electric bench grinder to make it easier to maintain wheel speeds under load.

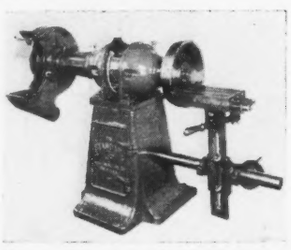
It is for use on alternating current only, maintaining a 3,600-r.p.m. spindle speed on 60-cycle current and 3,000 r.p.m. on 50-cycle current.

Grinder, Combination

The Standard Electrical Tool Co., Cincinnati, Ohio.

Made in 2-, 3-, 5-, and 7½-hp. sizes, this combination grinder has a ring wheel chuck on one end and an abrasive wheel on the other.

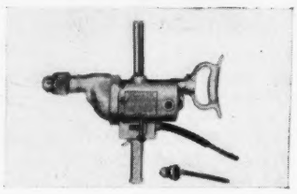
Bearings are of the SKF ball type. A ball thrust bearing is provided to take the end thrust of the wheel chuck.



Drill, Portable Electric

Wodack Electric Tool Corporation, 4627 W. Huron St., Chicago, Ill.

This portable electric drill which is suitable for general drilling and for use with a



bench stand has a capacity up to 5/8 in. in steel and up to 2 in. in wood, depending on the material, and on the depth required.

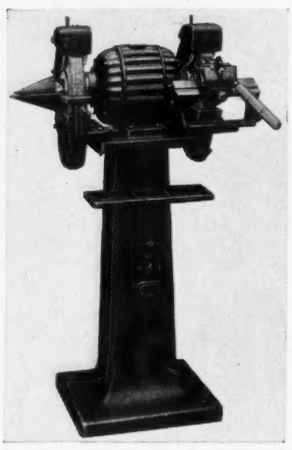
It is equipped with a universal motor for use on 60 cycles or less, and for voltages of from 110 to 125, or 220 to 225, as desired.

Grinder, All Purpose Tool

J. G. Blount Co., Everett, Mass.

Double recessing of flanges provides a double seal against grit and dust entering either the bearings or the motor of this all-purpose tool grinder, which is driven by a 1-hp. 1,750-r.p.m. fully-inclosed, dust-proof Westinghouse motor.

Complete equipment includes three wheels: A coarse wheel,

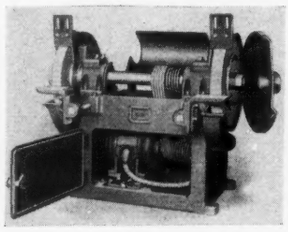


10 x 1½ in. for general shop use; a fine wheel of the same size for the grinding of tools, and a grinding cone for gages and inside curved tools.

Snagging Grinders, High-Speed

The Hisey-Wolf Machine Co., Cincinnati, Ohio.

Of the two high-speed grinders making up this line, the single-speed type is recommended where a number of machines in operation offer an opportunity to change the wheels as

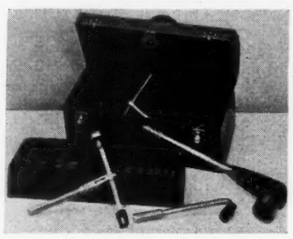


they wear to a machine of higher spindle speed, thereby maintaining approximately the original peripheral speed. These machines are made in three sizes for 18-, 20-, and 24-in. wheels.

Wrenches, Millwright

Stevens Walden-Worcester, Inc., Worcester, Mass.

Millwright wrenches, known as the No. 69 Set, consist of a complete assortment of sockets for W. S. S. nuts and cap

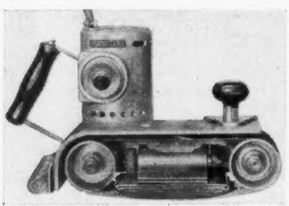


screws from ¼ to 1⅜ in. in diameter, and square sockets from ⅜ to 1¼ in. square.

Sander, Type B-7 High-Frequency

Porter, Cable Machine Co., Syracuse, N. Y.

Similar in many respects to the Types B-4 and B-5, this Type B-7 take-about, hand-belt



sander is equipped with a 1½-hp., 10,800-r.p.m., 220-volt motor for operation on a frequency of 180 cycles.

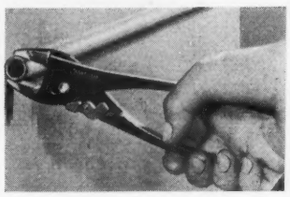
Standard equipment includes 6 belts, a ½-in. felt-covered shoe, and a 20-ft. rubber-covered, four-conductor cable without plug.

Pliers, "Kant-Slip"

Kant Slip Plier and Tool Co., 6036 Wentworth Ave., Chicago, Ill.

Cam, fulcrum, and wedge actions are combined in the pliers shown in the illustration.

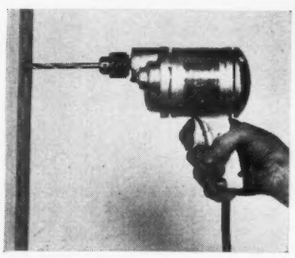
Because of its jaw action and clamping power round, square, hexagonal or other objects of any shape are held vice-like with little effort.



Drill, ¼-In. Electric, No. 000-U "Wonder"

James Clark, Jr., Electric Co., 600 Berman St., Louisville, Ky.

A drill that is suitable for work in close quarters, having a no-load speed of 2,000 r.p.m.



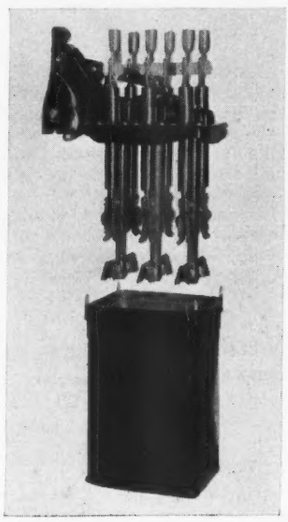
and a full-load speed of 1,200 r.p.m. The drill is 7½ in. in length, and weighs 4½ pounds.

Substation Equipment

Oil Circuit Breaker, Type FK-33

General Electric Co., Schenectady, N. Y.

These two-, three-, and four-pole, single- and double-throw, 200- and 400-amp., 4,500-volt oil circuit breakers designated as type FK-33, have interrupting capacities of approximately

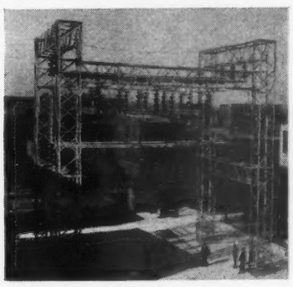


20,000 kva. at the rated voltage. They were designed for use where a substantial breaker of moderate interrupting capacity is required.

Substation, Outdoor

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

A type of outdoor substation, designated Type F, in which, by means of rotating bus and switch combinations, the num-



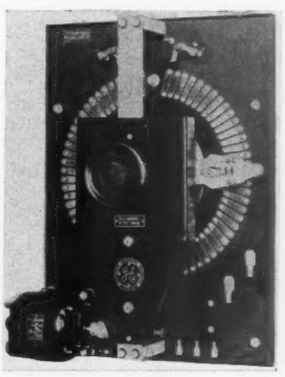
ber of insulators used on the older forms of stations has been cut in half.

This design of substation is especially adapted for 66 kv. and above.

Switches, Radial

General Electric Co., Schenectady, N. Y.

This line of radial switches includes five forms, for hand, sprocket, gear, solenoid, and motor operation.



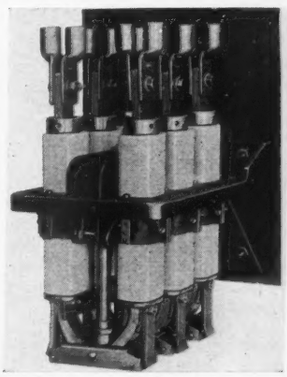
Regardless of how they are operated, the switches designed for 100-amp. service have 65 divisions; the 200-amp. switches have 48 divisions, and the 300-amp. switches have 40 divisions.

For the smaller hand- or sprocket-operated devices a 50-division switch similar to the 65-division form is offered.

Oil Circuit Breaker, Type "O"

Roller-Smith Co., 233 Broadway, New York, N. Y.

Oil switches in this line are made in capacities from 200 to



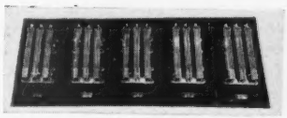
2,000 amp., from 2,500 to 15,000 volts, and with interrupting capacities from 20,000 to 40,000 kilovolt-amperes.

They are made as two-pole and three-pole devices, automatic and non-automatic, single and double throw for switchboard, wall, and cell mounting; also for hand operation, normal and remote control, and electrical operation.

Disconnecting Switches, Back-Connected

Champion Switch Co., Kenova, W. Va.

These 4,500-amp., 4,500-volt disconnecting switches are of the back-connected, single-

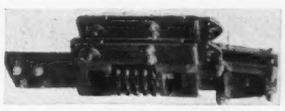


throw type for mounting on slate, marble, or soapstone bases.

Disconnecting Switch, Type WT-14

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

A double-blade, tongue-type disconnecting switch, designed for clamping directly on bus bars.

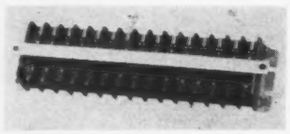


Its use affords a convenient method of inserting a disconnect between the oil switch and the bus, thus securing a high space factor and short runs to the oil switch terminal.

Terminal Boards, Fabricated

General Electric Co., Schenectady, N. Y.

A fabricated terminal board recommended for use where a large amount of small wiring



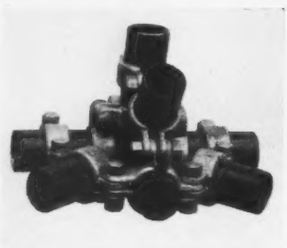
is necessary on the back of a panel. It consists of a number of terminal blocks separated by suitable barriers assembled on rods with end lugs for mounting, and white marking strips to enable each circuit to be identified.

Any practical number of poles can be built into a single unit.

Pipe Fittings, "Uniclamp"

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

Each fitting in this line of pipe fittings, designated as "Uniclamp," has one short ear pro-



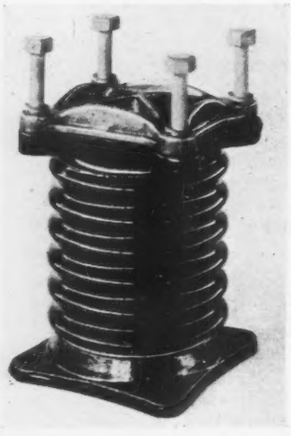
jection which lines up with the center line of the pipe, and a long ear 5/16 in. from the pipe center line. The long ear of one clamp is always fitted over the short ear of the clamp next to it.

Bus Support, Indoor-Service, Heavy-Duty

Champion Switch Co., Kenova, W. Va.

Porcelain units in this improved line of heavy-duty bus supports for indoor service up to and including 25 kv. are furnished in diameters of 4, 5 and 6¼ inches.

Bus clamps are heavily ribbed and will accommodate several bus bars with spacers.

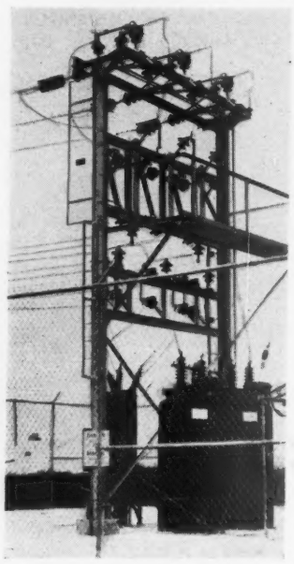


Substation, Outdoor Structural

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

Stations of the type shown are made for all commercial voltages and a wide range of transformer capacities.

High-tension service is brought in through a gang-operated, three-pole, vertical-



break switch mounted on the top of the structure, the switches being controlled from the ground level.

Metering is done on the high-tension side, the station being provided with disconnecting switches having by-pass blades.

Insulator Supports

Champion Switch Co., Kenova, W. Va.

A line of clamp insulator cable supports for either flat or pipe mounting in which the support-

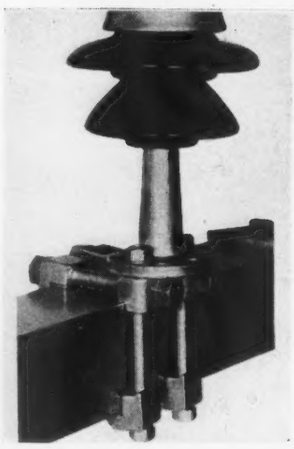
ing bases are malleable iron and the top clamps alloy steel.

Interchangeable white-glazed porcelains are used. This design is intended for installations of wide temperature variations such as exist in coke plants, foundries, and so on.

Clamps, Beam

General Electric Co., Schenectady, N. Y.

These improved beam clamps permit the changing of existing installations to accommodate



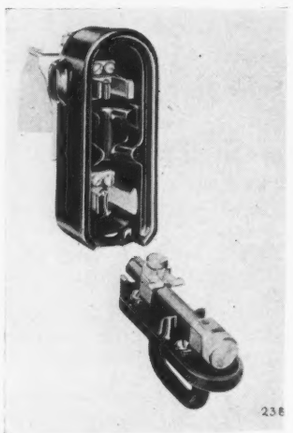
apparatus without the need of drilling of structural steel members.

They consist of hot-dip, galvanized, malleable-iron castings and the necessary bolts and nuts.

Fuse, 2,300-Volt

Line Material Co., South Milwaukee, Wis.

This fuse has an over-all width of 3 in. from the outside of the lead entrance on one side of the box to the outside of the lead entrance on the other side. It has a continuous rat-



ing of 2,300 volts at 30 amperes.

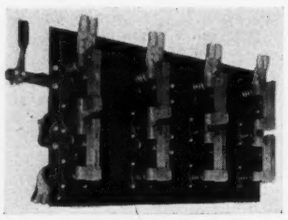
Its housing is of wet-process porcelain having a flash-over value between terminals and hanger of 28,000 volts dry, and 14,000 volts wet.

Contact clips are double phosphor bronze to insure evenly distributed pressure on the cartridge contact blocks.

Disconnecting Switches, Gang-Operated

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

A gang-operated selector switch, the blades of which are opened and closed simultane-

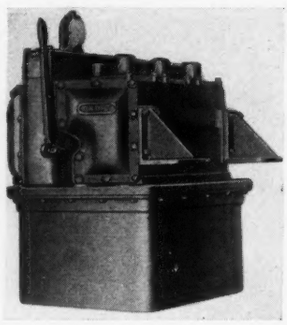


ously by means of an interlocked mechanism. The handle may be located at any convenient point.

Oil Circuit Breaker for Underground Service

Condit Electrical Manufacturing Corporation, Boston, Mass.

Known as the Type M-210, this oil circuit breaker of moderate interrupting capacity for underground distribution service



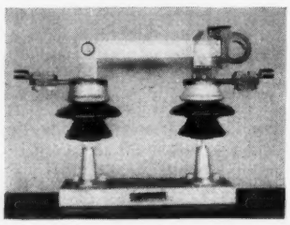
up to 15,000 volts is furnished manually operated, three pole, single throw for 400 amp. at 15,000 volts, non-automatic or full automatic, (trip-free) with an estimated interrupting capacity of 60,000 kilovolt-amperes.

Disconnecting Switch with Pry-Off Type Latch

Pacific Electric Manufacturing Corporation, San Francisco, Calif.

Designated as Type BB-1, this disconnecting switch is equipped with a pry-off latch that securely locks the switch in a closed position. When opening the switch the latch exerts additional leverage to break ice or sleet at the start of the opening stroke.

Insulators are of the standard, porcelain-cemented cap and pin type. The contacts are of the tongue type with guides and blade contact

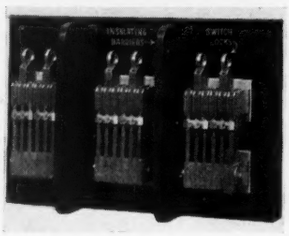


ground in on a blade grinding machine after the switch has been assembled.

Unit Switches, Heavy-Capacity

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

In this line of unit switch assemblies which can be mounted on slate or soapstone bases,



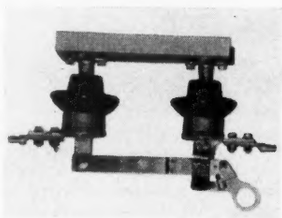
the switch studs are composed of flat bars extending through the base affording a convenient method of attachment to heavy flat conductors.

A three-pole 6,000-amp., 2,300-volt arrangement is shown in the illustration.

Disconnecting Switch, Outdoor-Form

Champion Switch Co., Kenova, W. Va.

This outdoor-form disconnecting switch with interchangeable insulator units has a blade of the truss form. The tongue

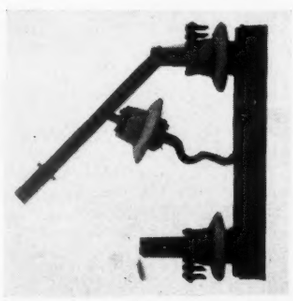


engages self-aligning, full-floating contacts with the blade guides.

Disconnecting Switch, Gang-Operated

The Champion Switch Co., Kenova, W. Va.

Illustrated, is a single-pole element of the above company's

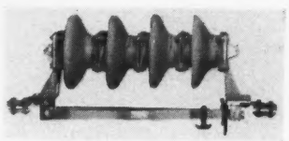


line of gang-operated disconnecting switches. The blade is provided with a pivoted insulator, the shaft of which passes through the base and is interconnected with the two other elements. The blade is of the reinforced truss construction and the contacts are of the full-floating, self-aligning type.

Disconnecting Switch, Suspension-Type

Champion Switch Co., Kenova, W. Va.

In this suspension-type line hook stick operated disconnecting switch the interchangeable

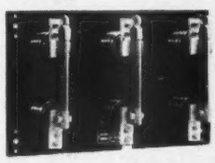


units are shunted by a reinforced truss blade in turn provided with blade guides, lugs and compression-tvpe solderless connectors.

Switch Units, Grouped

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

A grouped unit consisting of three single-pole disconnects mounted on a steel base ready



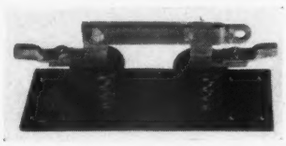
for immediate installation.

Bases are drilled for mounting directly on flat surfaces by means of four bolts or, by using U bolts the bases can be mounted on pipe structures.

Disconnecting Switches, Tongue-Type

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

All insulator units are interchangeable in this improved and simplified form of tongue-type disconnecting switch. The blades are adjustable to compensate for wear. The base can be mounted on flat surfaces or on 1¼-in. pipe by means of U bolts.

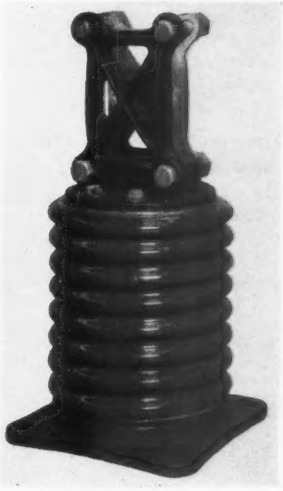


Bus Supports, Heavy-Duty

Champion Switch Co., Kenova, W. Va.

An improved line of bus supports with cantilever strengths up to 10,000 pounds.

Porcelain units are made in



several diameters and heights and are provided with fittings for all types and sizes of conductors.

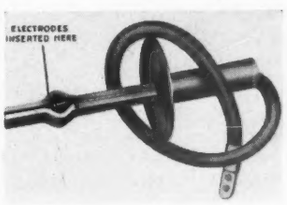
Welding Equipment

Electrode Holder

Fusion Welding Corporation, 103rd St. and Torrence Ave., Chicago, Ill.

This electrode holder was designed to obviate the overheating due to improper contact between the electrode and holder.

Insertion of a fresh electrode ejects the stub of the



old one and automatically removes any insulating material from the rod thus insuring four clean contact points

Helmet Goggles

The Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

Fiber cap, and skeleton-type helmet goggles have been added to the line of equipment supplied by the above company. The goggles are at-

tached to cap, by means of a fiber link in such a way that they may be raised or lowered by one hand.

The skeleton-type helmet differs from the cap only in that it is open as shown in the illustration. Both styles are adjusted to fit the head by means of a leather strap at the rear.

Cutting Torches

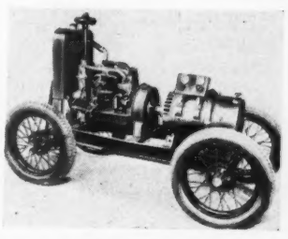
Torchweld Equipment Co., 224 N. Carpenter St., Chicago, Ill.

Made from die-pressed metal and solid brass bar stock, these cutting torches, designated as No. 18 MC (one-piece-tip) and No. 28 MC (two-piece-tip), have metal-to-metal seats on the high- and low-pressure lines, with positive flash back and back pressure safety features.

Arc Welder, Engine-driven, Portable

The Fusion Welding Corporation, 103rd and Torrence Ave., Chicago, Ill.

In this portable, gasoline-engine-driven, arc-welding outfit which is available in two sizes; 200- and 300-amp. capac-

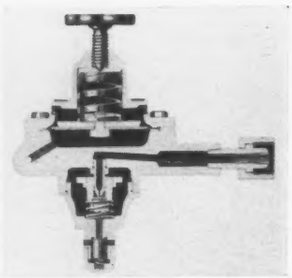


ity, a method of interpole connection in the generator puts a stabilized current into the welding lines, eliminating other devices used to help stabilize the arc. A single brush shifting control, calibrated in amperes, gives the desired current setting.

Regulator, Oxygen, with Safety Release Valve

Torchweld Equipment Co., 224 N. Carpenter St., Chicago, Ill.

One of the features of this oxygen regulator is the safety release valve with which it is equipped and which can be put on all Torchweld regulators



now in use. The safety valve is fitted to the back cap of the regulator. It is automatic in operation. When the oxygen pressure becomes excessive in the regulator body the safety valve permits gas to escape through an opening in the back cap until the pressure is again normal.

Gloves for Welders

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

A soft, pliable suede leather, specially treated to prevent heat from affecting it supersedes the horsehide formerly used in these gloves.

A leather strip on the thumb seam and a semi-circular reinforcement on the inside seam adjoining the palm reinforce the glove. The left glove has a leather reinforcement covering the entire back between the fingers and gantlet for protecting the back of the left hand during cutting operations. A close fitting gantlet adequately protects the arms.

These gloves will not stiffen or shrivel from the application of heat or from soaking in water.

Welding Rod, No. 21 Bronze

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

This rod is recommended for all bronze-welding applications including the fusion welding of brass and bronze, bronze-welding of malleable and gray-iron castings, joining dissimilar metals, and building up bearings and other wearing surfaces.

Electrode Holder, Water-Cooled Carbon

The Lincoln Electric Co., Cleveland, Ohio.

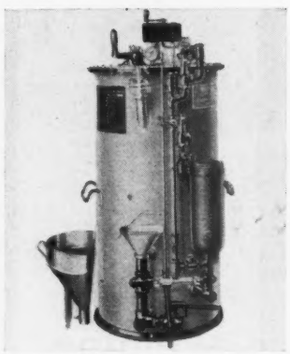
Designed primarily to insure greater comfort and less fatigue for the operator. The

holder consists of coiled copper tubing through which water constantly circulates, the carbon electrode being inserted through the coil. They are manufactured in sizes for use with ¼-, 5/16-, ⅜-, and ½-in. carbons. A hand shield of compressed magnesium protects the operator's hand from the arc. The water cooling system also keeps the hand grip cool.

Generator, Medium-Pressure Acetylene

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

This Prest-O-Weld, Type MP-101, medium-pressure acetylene generator is adequate for any



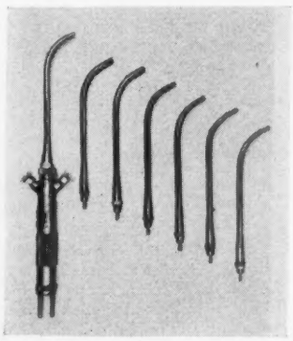
welding or cutting operation and can easily be carried from place to place on a truck or wagon.

The carbide capacity of this generator is 30 lb. The overall dimensions are: Height, 60 in.; width, 34 in. The weight when empty is 305 lb., and with a full charge of carbide and water, the total weight is 623 lb. The generator can be inclined to an agle of 30 deg. from the perpendicular without tipping.

Welding Blowpipe, Type W-15

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

Although this device was designed especially for aircraft fuselage welding it may be used in other fields, and like



other Oxweld blowpipes it is of the injector type and can be used on low-pressure acetylene supply.

Welding heads, seven in number, supplied with the blowpipe, are equipped with drawn copper tips to withstand high temperatures and are curved to reach hard-to-get-at places.

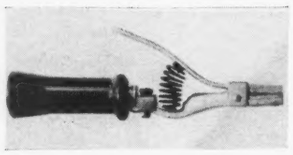
Each welding head is detachable as a unit and each injector can also be detached from the welding head and replaced if necessary.

Electrode Holder, Improved, Type T

The Lincoln Electric Co., Cleveland, Ohio.

All metallic parts of this holder are cadmium plated.

It consists of a handle and clamp to hold the electrode while welding. A release feature permits changing electrodes quickly. The welding

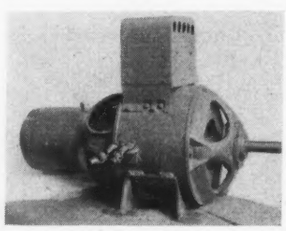


current is carried from the point of cable entry to the copper jaws by copper strips of low resistance. The copper tips on the jaws reduce the sticking of the electrode to the jaws facilitating change of electrodes and longer life for the holder.

Generator, for Belted or Coupled Service, Welding

Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pa.

Intended for use in isolated places where electric power is not available and where driving power such as gasoline en-



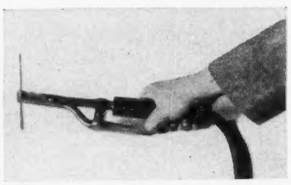
gines, steam engines, lineshafting, tractors, etc., are already at hand, this 200-amp. unit complete, consists of a special, constant-current, Type SK welding generator with coupled exciter overhung from the generator bracket, control panel and reactor.

It has a welding range of from 60 to 250 amp. and requires a driving unit whose maximum rating is: Motor—10 hp.; lineshaft—15 hp.; gas engine—20 horsepower.

Electrode Holder, Metal

Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pa.

A light, well-balanced and durable metal electrode holder which is capable of handling



all commercial sizes of electrodes up to and including ¼ inch.

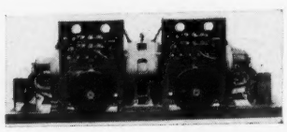
Complete equipment includes 5 ft. of flexible cable attached.

There is also an adapter for use in conjunction with the metal electrode holder for light-carbon electrode welding or cutting, which handles ⅜- and ½-in. carbon rods.

Generator, "Dualarc," Cutting and Welding

Electric Arc Cutting & Welding Co., 152 Jelliff Ave., Newark, N. J.

This unit consists of two, ball-bearing equipped, interpole, self-excited generators having



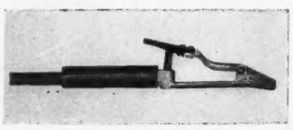
special field connections, closely coupled and directly driven by a standard induction motor. It is mounted on a structural-steel base plate to which wheels can be added for portable use.

Reversing the series field at the switchboard of the "Dualarc" generator permits the operator to obtain 20 to 40 volts at the welding handle for use with metal electrodes, or 40 to 60 volts for carbon arcs.

Electrode Holder, Clamp-Type

General Electric Co., Schenectady, N. Y.

This device has jaws of heavy copper alloy, notched to hold firmly any size of electrode wire from 1/16 to ¼ in. in



diameter, in any position. It is designed for use with currents up to 300 amperes.

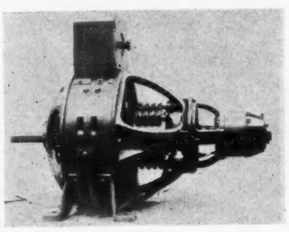
A molded-compound handle protects the operator from heat and from contact with current-carrying parts.

Welding Generators, Single-Operator, Belted and Coupled Types

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

In this line of 300- and 400-amp. single-operator arc-welding generators of the belted and coupled type, a complete unit includes a generator, a direct-connected exciter, a control panel, and a reactor.

They are intended to be used where driving power such as



motors, gasoline engines, tractors, lineshafting, etc., are already available.

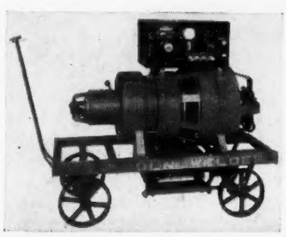
Owing to the separate excitation feature, variations of arc length or intensity are automatically compensated for by instantaneous changes of generator voltage. The welding current range of the 300-amp. unit is 90 to 175 amp. while that of the 400-amp. unit is 120 to 500 amperes.

Unified Control for "Stable-Arc" Welders

Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland, Ohio.

Unification of motor and generator controls features the improvements incorporated in the "Stable-Arc" welders made by this company.

All control working mechanism is contained in a ventilated, inclosed steel cabinet with hand regulators and switches mounted on a panel forming a side of the cabinet. The mounting of this cabinet over the motor generator permits the use of a shorter chassis frame.

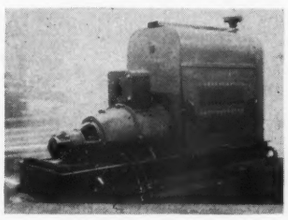


A safety push-button switch is incorporated in the control panel for starting and stopping of the welder, and to eliminate accidental starting.

Welding Set, Gas-Engine Driven

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

For supplying welding where a local power supply is not available, this gas-engine



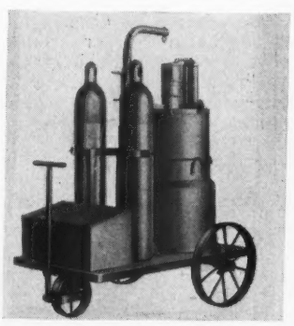
driven, single-operator arc welding set consists of a Model P-35 Continental 4-cylinder gas engine direct connected to a 300-amp., single-operator, Type SK, arc-welding generator with a flexibly-coupled exciter overhung from the generator bracket.

Protective covers over generator, commutator, and engine hood make the complete equipment suitable for service in all weather conditions without the use of a canopy. The set can be made portable by the addition of running gear.

Trucks for Carbic Generators

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

To accommodate the Types CLP-3 and CLP-2 Carbic low-pressure acetylene generators two types of trucks have been designed.



As shown by the illustration, the truck designed to carry a Type CLP-3 Carbic generator holds two cylinders of oxygen. A crane is provided also to be used in charging and emptying the generator.

For the Type CLP-2 Carbic generator a smaller truck is used that will accommodate one cylinder of oxygen.

Welding Electrode, "Kathode"

Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland, Ohio.

Manufactured in stock lengths of 14 and 24 in., these electrodes are intended for the arc welding of mild steel and for cast iron repair work.

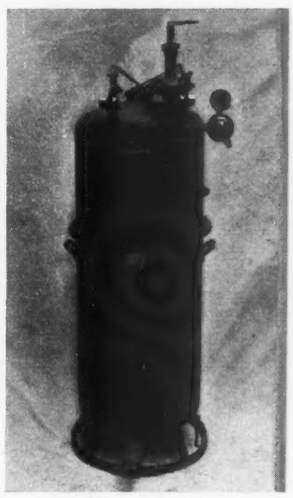
To provide protection during shipment the rod is packed in metal containers holding 50 lb. each.

Generator, Acetylene

Alexander Milburn Co., Baltimore, Md.

A portable acetylene generator for welding and cutting that is made in 35-, 70-, and 100-lb. capacities.

Carbide hopper feed control and head are assembled in one unit which can be detached from the seamless body by the removal of a few bolts. The



carbide feed is controlled by a single valve which responds to high or low pressure and automatically stops if the pressure is at zero, or if the filler is open, or if the generator is not properly closed.

It is equipped with blow-off valves, pressure control, safety gas purifier and strainer.

Welder, Gas-Engine-Driven

Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland, Ohio.

Powered by a 4-cylinder Waukesha engine operating at 1,500 r.p.m., this 200-amp. welder is intended for use

where electric power is not available.

All improvements featured in the improved models of Lincoln gas-engine-driven welders are included in this model.

Electrode, "Weldite" No. 18 "Yellow Jacket"

Fusion Welding Corporation, 103d St. & Torrence Ave., Chicago, Ill.

A welding rod for arc-welding that will weld 3/8-in. unbeveled plates with one passage of the electrode from one side.

It is especially manufactured for making heavy, mild-steel arc welds.

Welding Rod, No. 21 High-Strength Bronze

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

A high-strength, bronze welding rod with a low melting point used for bronze welding steel, bronze, brass, cast iron, malleable iron, wrought iron, copper, nickel, Monel metal and similar metals, and for building up wearing surfaces and for fusion welding of bronze, brass and other copper alloys.

It is obtainable in the standard sizes and in standard-weight bundles.

Welding Rod, No. 65 High-Tensile

Una Welding and Bonding Co., Cleveland, Ohio.

Having a tensile strength of approximately 60,000 lb. per sq. in., this welding rod is intended for flat, vertical and overhead manual welding, and flat automatic welding.

It is available in unit packages of 25 lb. in standard sizes varying from 1/8 to 1/4 in. in diameter, and in 14-in. lengths, and also in rolls for automatic arc-welding.

Hand Torch, Acetylene

Linde Air Products Co., 30 East 42nd St., New York, N. Y.

This hand torch uses acetylene as fuel and consists of a standard 10-cu. ft. gas tank to

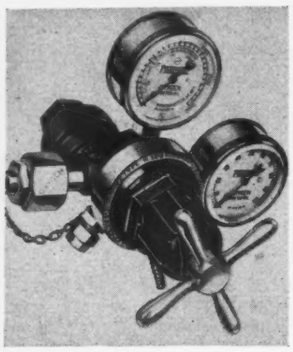
which a burner and handle are attached.

It is adaptable to all kinds of soldering, splicing, wiping and similar operations either inside or out of doors.

Regulator, Two-Stage Oxygen

Oxweld Acetylene Co., 30 East 42nd St., New York, N. Y.

Instead of reducing the full cylinder pressure down to working pressure in one stage, the R-109 regulator reduces it



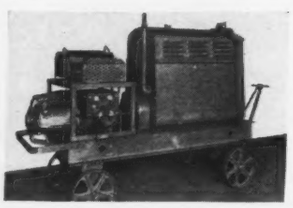
in two stages. In the first stage the cylinder pressure is reduced through a non-adjustable reducing valve to about 175 lb. per sq. in. The second-stage reducing valve, being adjustable by means of hand wheel, gives the desired working pressure.

When the pressure in the cylinder falls below 175 lb. per sq. in., the first-stage valve remains fully open. It is thus automatically cut out of the system and the second-stage valve and diaphragm only are operative.

Arc Welder, Portable, Gas-Engine-Driven

General Electric Co., Schenectady, N. Y.

A 6-cylinder Buda Model HS-6 gasoline engine whose rating is 39 hp. at 1,440 r.p.m. is used to drive the self-excited, single-operator generator rated



300 amp., and bearing designation WD-300-A, making up this portable, electric arc-welding set.

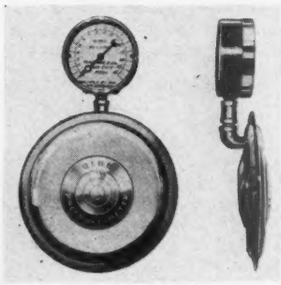
It is mounted on a welded, structural-steel base and may be made portable by the addition of running gear.

Pressure Meter, Welding Machine

Gibb Welding Machine Co., Bay City, Mich.

A device that indicates in pounds the pressure obtained at the welding electrodes.

To determine a certain welding pressure the oil-filled

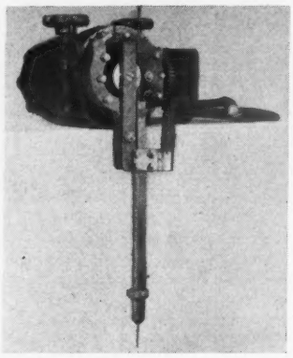


disk is placed between the electrodes of the welding machine and the pressure applied is registered in pounds by the indicating part of the meter.

Automatic Welder, "Weldomatic"

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

Other than to press the starting button the "Weldomatic" automatically strikes and holds an arc between an electrode and the work to be welded



without the aid of an operator. The feeding device is of compact design which permits its ready application to work handling tools.

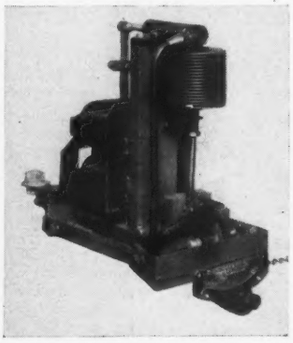
Complete equipment includes the electrode feeding device, control cabinet and operator's panel.

A small m. g. set in the cabinet automatically controls the head motor in changing its speed and the direction of the electrode feed as required by arc conditions.

Idling Device for "Stable Arc" Welders

Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland, Ohio.

A device that automatically increases the speed of the engine



from normal idling speed to the proper speed for welding service whenever the arc is struck.

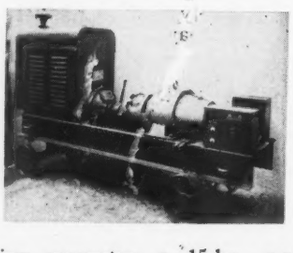
When welding is discontinued, the device automatically reduces the speed of the engine to normal idling speed.

It is so designed that a momentary interruption in welding will not cause a reduction in the speed of the engine.

Welding Unit, Dual-Drive

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa.

This dual-drive, arc-welding unit consists of a standard, 300-amp., single-operator weld-



ing generator, a 15-hp., a.c. motor, and a 6-cylinder, 1,800-r.p.m., Model P-45, Continental gas engine, all mounted in tandem on a structural-steel welded base.

By engaging or disengaging a slip coupling or clutch, whichever is provided, the welding generator can be driven by either the gasoline engine or the electric motor.

Welding Rod, "Hascrome"

Haynes Stellite Co., Kokomo, Ind.

Although it does not possess red hardness to the same degree as Stellite, this manganese-chrome-iron welding rod, designated "Hascrome," may be used for hard-surfacing parts subject to abrasive wear.

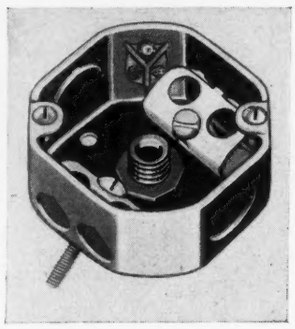
Because the hardness of the deposited metal can be controlled by the amount of excess acetylene as well as by the rate of cooling this metal is best applied by the oxy-acetylene process, however, it may be applied by means of the electric arc.

Wiring and Distribution Equipment

Outlet Box, No. 1288X

Chicago-Jefferson Fuse & Electric Co., 1500 S. Laflin St., Chicago, Ill.

An outlet box with a reversible clamp and bushing plate for side or bottom knockouts



and suitable for use with metallic cable, non-metallic sheathed cable or loom.

It permits the use of any type fixture stud and hickey in the smaller 3¼-in. box.

Wiring Devices

Russell & Stoll Co., 53 Rose St., New York, N. Y.

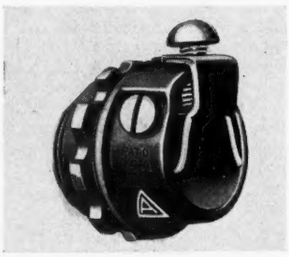
A two-gang, four-wire receptacle for high-cycle equipment

with a rating of 10 amp. at 250 volts, and 15 amp. at 125 volts. The receptacle as illustrated will fit various standard outlet boxes.

Connector, U-Type, Adjustable

The Appleton Electric Co., 1701 Wellington Ave., Chicago, Ill.

These No. 7280 Connectors have U-type adjustable clamps for use with non-metallic sheath cable or loom. A copper screw provides a ground for the neutral wire while a notched nut permits the con-

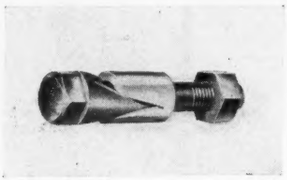


nector to be securely fastened with a screw driver and hammer. They are available in 45- and 90-deg., and double types.

Bolt Anchor

Kempton Manufacturing Corporation, 148 West 23rd St., New York, N. Y.

These E-Z bolt anchors are available in sizes for use with machine bolts ranging from

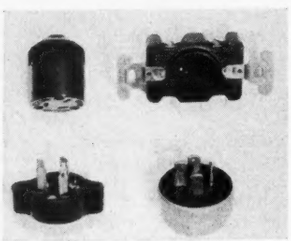


¼ to 1 in. in diameter. They consist of a wedge-shaped cast iron part which, as the nut is drawn down on the bolt, expands the lead part forcing it into the rough surface of the hole.

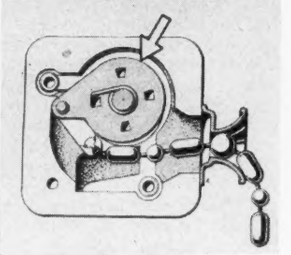
Wiring Devices

Harvey Hubbell, Inc., Bridgeport, Conn.

Of the wiring devices shown, the three-wire, polarized, flush-



type motor plug is of molded composition fitting into a metal base. In the surface



type the base as well as the plug is of molded composition. The capacity is 10 amp. at 250 volts, or 15 amp. at 125 volts.

With the pull socket, a one-piece porcelain body is used with a simplified ratchet mechanism. The commutator contact is formed from one piece of metal which also serves as the center lamp contact.

Conduit, "Steeltubes"

Electrical Division of Steel and Tubes, Inc., Cleveland, Ohio.

This conduit, called "Steeltubes," is a thin-wall, rigid tubing made from a cold-rolled steel which tends to resist corrosion and is ductile enough to

be readily bent to any desired shape by means of a special hickey supplied by the manufacturer.

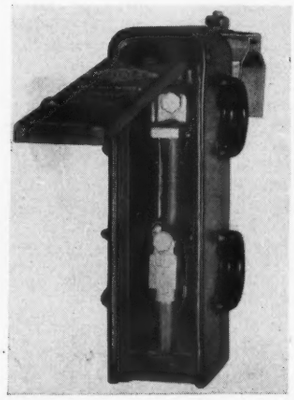
It can be used without threading, connections being made by means of union compression- pe couplings, part of which m..y be used as an adapter to take standard thread or threadless fitting:. It is furnished in ½-, ¾-, and 1-in. electrical trade sizes.

Switches, "Fuswitches"

W. N. Matthews Corporation, St. Louis, Mo.

These porcelain switches have the same features as the Tidewater Cypress Housed Fuswitches namely: no live parts on the door of the switch; an adjustable hanger; a double-tube cartridge; flat-surface, pressure-type contacts; and inspection without interruption of service.

Catalog No. 700 switches have a rating of 60 amp. at 2,500/4,400 Y volts; a rupturing capacity of 3,000 amp.; a dry flashover of 43,500 volts, and a wet flashover of 20,000 volts.



Catalog No. 800 switches are rated 60 amp. at 7,500 volts, and have a rupturing capacity of 4,000 amp.; a dry flashover of 48,000 volts, and a wet flashover of 27,500 volts.

Cable Sling, Dead-End

American Cable Co., 215 N. Michigan Ave., Chicago, Ill.

These dead-end sling fittings, which are shown attached to the wire rope and which fit

into the shackle and cotter-pin bolt, are merely steel cylinders that have been slipped over the unseized end of the preformed rope and processed under hydraulic pressure so as to cold flow the steel into the interstices of the wire rope, thereby locking it to the rope with unfailing security.

Transite Pipe

Johns-Manville Corporation, 292 Madison Ave., New York, N. Y.

Transite pipe, a seamless pipe made of asbestos and cement, is furnished in five general classes: one class of light weight designed for flue piping and exhaust stacks; and four pressure classes to carry liquids at working pressure of from 40 to 225 lb. per square inch.

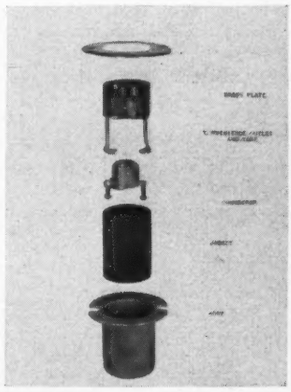
The flue pipe is not affected by the ordinary stack temperature and is suitable for venting house-heating boilers, automatic water heaters, and for chemical service. The pressure pipe is suitable for delivery of hot or cold water, brine, and various process liquids and solutions under pressure.

It is readily cut, tapped or threaded with the same tools and in the same manner as iron pipe. Its weight is from 50 to 65 per cent less than cast-iron or steel pipe.

Outlet, General Utility

General Electric Co., Bridgeport, Conn.

This miniature-type utility outlet, No. SP-8000, is suitable for rapid installation in floors,



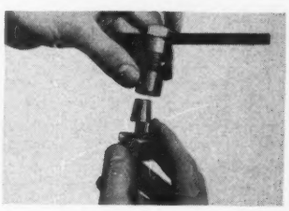
baseboards or mantels. The method of installation and the reduction in the size of the box are made possible by the internal connector, which eliminates the long leads and taped joints.

This outlet box consists of a galvanized drawn-steel shell, in which is incorporated a fixture comprising a standard receptacle and a connector, either BX or flexible conduit. Each box is provided with a brass flush plate which is secured by two screws which also hold the entire unit in place.

Connector, Solderless

Penn-Union Electric Corporation, Erie, Pa.

There are only four parts to handle in this connector, which is intended for use on high-



tension and distribution lines.

These connectors are made up in a complete line; elbows, tees, two-way, three-way and so on for use with solid rods, copper tubing, and stranded cable.

Flexible Cable

General Electric Co., Schenectady, N. Y.

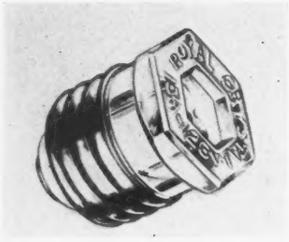
A feature of the design of the "BX" Armored Bushed Cable is that the use of tools for stripping is eliminated. The double armored construction consists of a flexible steel armor and a kraft armor between steel and conductors. The kraft armor which replaces the outer braid requires no tools for removal. It strips automatically to provide space for the "Anti-Short" bushing, the insertion of which

between the sharp edges of steel and the conductors increases the insulation at the most critical point.

Fuses, Crystal Glass Top

Royal Electric Co., Chelsea, Mass.

A feature of the design of the crystal glass top fuses



shown is the hexagon head which identifies all Royal crystal fuses of 15 amp. or under.

Toggle Switch, Shallow Flush

Harvey Hubbell, Inc., Bridgeport, Conn.

A special form of contact spring in these shallow flush toggle switches prevents burning of the contacts at "make."

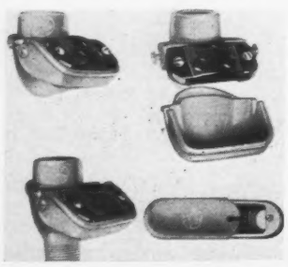
This form of contact spring is designed so that two different rates of vibrations are set up in the spring, one tending to counteract the other.

An automatic kick-off prevents sticking of the blades in contact. The operating mechanism is separate and insulated from the bridge. A Bakelite case completely incloses the mechanism.

Fittings, Service Entrance

Adelet Manufacturing Co., 4610 St. Clair Ave., Cleveland, Ohio.

Part of the line of conduit service fittings is shown in the accompanying illustration. The



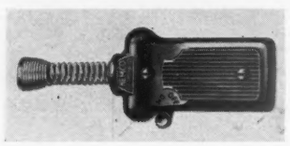
service entrance fitting consists of two parts; a base, and a cap. With it, it is not necessary to remove the composition cover in order to pull the wires.

Both ends of the cover of the service entrance Ell are drilled and tapped for cover-locking screws. This fitting holds the conduit close to the building. These fittings are also made with a spring locking cover so that when the cover is closed it cannot be reopened without so damaging the cover that the tampering is at once apparent.

Switch Plug

The Bryant Electric Co., Bridgeport, Conn.

A switch appliance plug, designated Hemco No. H-260, made of Bakelite with strain relief



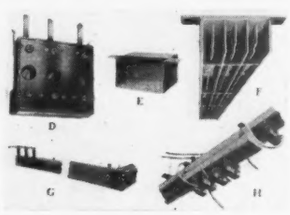
grooves where the cord enters the plug to take the strain from the terminals when the plug is removed from the appliance by pulling on the cord.

On the outside of the plug non-slip grips are provided to facilitate removal from the appliance.

Distribution System, "Flex-A-Power"

Trumbull Electric Manufacturing Co., Plainville, Conn.

A mobile system of unit lengths adaptable without alteration to any plant and especially those where production



requirements necessitate the frequent shifting or replacement of machinery.

Bus bars inclosed in a steel housing are used entirely in this system eliminating wire, rigid conduits, and power panels. The only connections necessary to the individual motors are those from the "Flex-A-Plugs," which consist of a non-breakable molded Bakelite cloth housing and cover plate having three extension prongs.

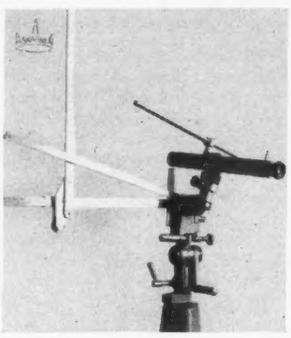
Additional outlets are possible with "Flex-Adapters," which are essentially short sections of Flex-A-Power except that contact receptacles are more closely spaced.

Flex-A-Power may be extended to all parts of a building with the aid of "Flex-Ells," "Flex-A-Tees," and "Flex-A-Crosses," and to other buildings or transformer banks by means of "Buss-Wa," which is similar in construction to Flex-A-Power and intended to be used as a main feed from the switchboard to Flex-A-Power and Flex-A-Power, Jr., branch systems. Buss-Wa has no branch outlet receptacles. Bus or lug-terminals sections are provided for connection to the main switchboard.

Altimeter, "Kuppers"

American Askania Corporation, Houston, Tex.

By means of this device it is possible to adjust transmission and distribution lines to a definite amount of sag. The distinguishing feature of the apparatus is a parallelogram



device coupled with a telescope that is free to swing in any direction.

It is erected at a convenient accessible point in the middle or outside the field of span where observations are made. A minor calculation is needed to determine the sag desired.

Conduit Fittings

Adapti Co., 2996 East 72nd St., Cleveland, Ohio.

There are three improved types of conduit fittings making up this line: A fitting for self-aligning pendants; a service entrance fitting; and a solid switch fitting particularly adapted for use in confined spaces.

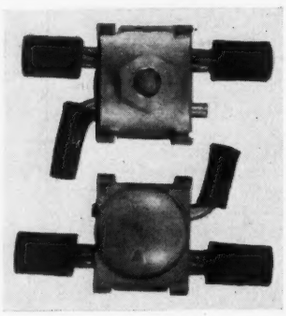
Where conduit stem pendants must be suspended from sloping, rough, or uneven ceilings the self-aligning pendant fitting is recommended. The fitting is made in three types: Left-handed, right-handed, and

straight-through. The service entrance fitting is designed to make the threading of the wires easier than in the usual type. The switch-fitting is of the standard solid type and it may be made weatherproof by the use of the water-tight cover shown.

Connections, Tap and Jumper

Delta-Star Electric Co., 2400 Block Fulton St., Chicago, Ill.

This three-piece, clamp-type connector for tap and jumper connections is for use on pri-



mary and secondary lines of distribution systems.

It is of the single-bolt type and avoids soldering operations which tend to anneal hard-drawn copper wire. The edges of both the top and bottom clamping pieces are rounded and will not cut the conductor.

One size of clamp takes any combination of through run and tap from No. 1 stranded to No. 6 solid. It is designed to carry 150 amperes.

Cables, Armored Large-Diameter

General Electric Co., Schenectady, N. Y.

Power and control cable with interlocked, flexible metal armor for installation without a conduit in central station, industrial, and other interior wiring applications can have any number and combination of conductors and any outside diameter up to 3 inches.

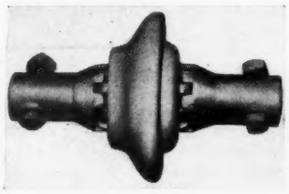
The armor is a layer of overlapping and interlocking metal tape, either galvanized steel or aluminum, so applied that the cable is always mechanically protected under reasonable installation conditions.

Varnished-cambric and rubber-insulated, either taped, braided or leaded, and paper-leaded cable can be supplied with the armor, in lengths up to 1,000 ft. for cables with an overall diameter less than 1 in., and in lengths up to 2,000 ft. for cables with an overall diameter between 1 and 3 inches.

Insulator, Pole-Top Switch

Champion Switch Co., Kenova, W. Va.

For insulating the operating mechanism shafts of gang-

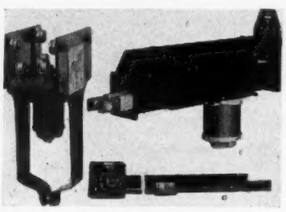


operated, pole-top switches, the above company offers the high-strength porcelain unit illustrated. To the upper and lower surfaces are secured fittings which can be readily attached to the switch operating pipe.

Distribution Systems, "Bus-Duct" and "Trolley-Duct"

Bull Dog Electric Products Co., 7601 Jos. Campau Ave., Detroit, Mich.

Of the two systems making up this line, "Bus-Duct" is de-



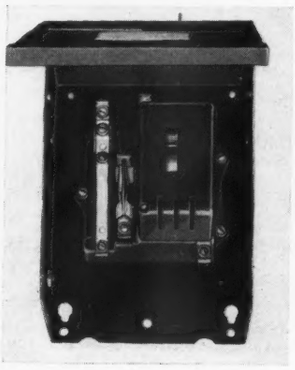
signed to supplant wires, conduits and other distribution panels in plants where motors and machines are frequently shifted to meet production schedules. "Trolley-Duct" is a flexible system of electrical control for portable tools used on assembly lines in mass-production plants.

Breaker, Meter Service

Square D Co., Detroit, Mich.

Absence of fuses in this breaker does away with the problems of sealed main fuses, accessible fuses, and interlocking doors.

Front manual operation permits breakers of this type to be banked more closely, and



recessed. The box of the breaker is of the usual size. Arrangement is made for ordinary meter trims and for banking troughs. There is a special bolt for locking the meter trims in place.

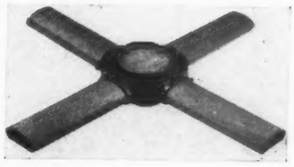
Wiring System, "Fiberduct"

General Electric Co., Merchandise Department, Bridgeport, Conn.

A non-corrosive raceway for under-floor wiring in concrete floors designed so that outlets may be installed at any point and at any time during the life of a building.

Composed of impregnated fiber, the duct is oval in shape with a wall thickness of 3/16 in. and a cross-sectional area of 3 square inches.

This system includes an adjustable brass-covered, cast-iron, rust-resisting junction



box and a line of brass surface fittings to accommodate the outlets where they are required.

Consolidations

Changes of Name

Industrial Controller Company, Milwaukee, Wis., consolidated with Square D Company, Detroit, Mich. Now known as Industrial Controller Division.

Acorn Heater Corporation, Bridgeport, Conn., changed name to The Electric Heater Corporation.

Roth Brothers & Company, Chicago, Ill., became a division of Century Electric Company, St. Louis, Missouri.

Yale and Towne Manufacturing Company, Stamford, Conn., purchased The Stueb-ing-Cowan Company of Cincinnati, Ohio, and Holyoke, Massachusetts.

Fusion Welding Corporation, 103rd St. and Torrence Ave., Chicago, Ill., a subsidiary of the Chicago Steel & Wire Company, Chicago, Ill., handles the sale of all welding rod manufactured by the parent company.

International Visible Systems Corporation, Cincinnati, Ohio, acquired "Brooks Visualizers," a product of the Brooks Company, Cleveland, Ohio.

Thompson Electric Welding Company, Lynn, Mass., and the Gibb Welding Machines Company, Bay City, Mich., consolidated as the Thompson-Gibb Electric Welding Company.

Oster Manufacturing Company, Cleveland, Ohio, merged with the Williams Tool Corporation, Erie, Pennsylvania.

Stanley Electric Tool Company, subsidiary of the Stanley Works, New Britain, Conn., acquired the Ajax Hammer Corporation, 117 West 63rd St., New York City.

The Falk Corporation, Milwaukee, Wis., adopted the method of distributing flexible couplings through distributors.

The Trumbull Electric Manufacturing Company, Plainville, Conn., formed the A. G. Electric Manufacturing Company, Seattle, Wash., as successor to the A. G. Manufacturing Company.

Air Way Electric Appliance Company, Toledo, Ohio, acquired Erie Heating Systems, Inc., Erie, Pennsylvania.

The American Pulley Company, 4200 Wissahickon Ave., Philadelphia, Pa., added "Sprucolite" pulleys, manufactured by the Sprucolite Corporation, Franklin Street, Bloomfield, N. J., to its line.

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EQUIPMENT NEWS

Industrial plant executives concerned with the selection and operation of mechanical and electrical equipment will be interested in these devices which are designed to improve plant operation or reduce operating and maintenance costs.

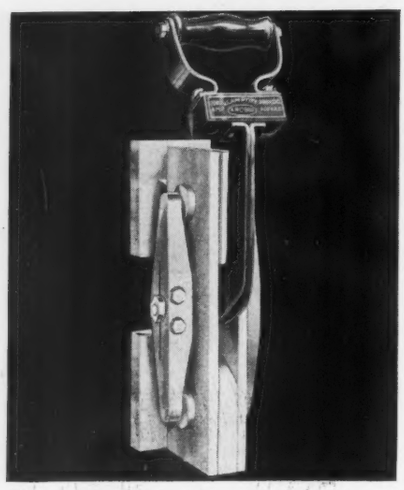
Automatic Reclosing "Klamp-Tite" Knife Switch

THE Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, is offering a knife switch, known as the "KLAMP-TITE," which is available in single-, double-, or triple-pole types in ratings from 600 amp. upwards.

In operation the contacts of the switch are first closed and then clamped, both with the same forward motion of the handle; thus making the contact joints equivalent to busbar joints. A heavy manganese steel clamping bar with distributing pressure foot at both top and bottom contact studs is attached to each outer switch blade by a clamping bolt with adjustable nuts fixed in the two clamping bars.

Two distinct steps take place in the opening and closing cycles. Moving from the open position the blades slide over the contact studs with a complete wipe and under the usual knife switch pressure to the closed position.

In moving from the latter position to the clamped position the blades remain stationary and the handle becomes a wrench rotating the clamping bolt clockwise into the two fixed nuts thereby tightening the clamping bars until it has completed its travel to a position directly above the upper contact stud. This action results in an enormous pressure being set up and transmitted equally to both top and bottom contact studs. This pressure is many times greater than that under which a knife switch could be manipulated ordinarily, and of such a value that it is impossible to pry the switch open.



Automatic Reclosing Klamp Tite Knife Switch

In opening, the opposite sequence of movements takes place and the clamping bolt is rotated counter-clockwise out of the nuts so as to reduce the high pressure to normal knife switch pressure before the blades start to move. A simple, but ingenious interlocking device prohibits the sequence of operations taking place in any other manner than that described.

Closing the switch allows the hand of the operator to follow the blades, while in opening the handle swings away from above the switch before the blades start to move. This action makes for safety in the event the switch is inadvertently opened under load, as the handle is out of the danger zone and not above the top contact stud when the break is made.

Paasche Type M U Universal Striper

FOR continuous striping in a vertical or a horizontal position, the Paasche Airbrush Company, 1909 Diversey Parkway, Chicago, Ill., developed a "Universal" striper, designated as Type M U.

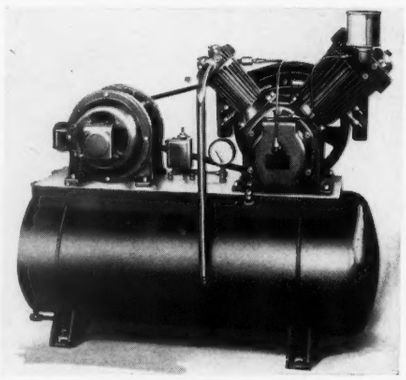
Special features include an adjustable line tip 1/32 to 3/32 in.; a tapered, knurled, adjustable regulator sleeve that gives quick and accurate color feed; revolving and adjustable guides; and detachable color cups.

An extra pressure color cup may be attached for striping overhead or underneath when it is necessary to force fluid upward to the slotted tip, or when heavy colors are used for obtaining a raised or embossed stripe, scroll or decoration. The pressure cup has a screw cover with plunger operated by a spring which continually feeds the color under pressure as the work requires.

Ingersoll-Rand Type 30 Two-Stage Air Compressors

A LINE of air-cooled, two-stage air compressors, known as the Type 30, in which a V-type belt drive is employed is announced by the Ingersoll-Rand Company, 11 Broadway, New York City.

These units are self-contained; the ball-bearing equipped motor and compressor being mounted on a steel base that is attached to the top of the air receiver, and which is built to withstand a 200-lb. working pressure.



Ingersoll-Rand Type 30 Two-Stage Air Compressor

Automatic start and stop control, furnished as standard equipment, operates independently, but in conjunction with the unloader. When the pressure in the air receiver reaches a point at which the regulator is set to unload, the motor is automatically shut off. A centrifugal governor allows the air in the high-pressure cylinder and intercooler to exhaust through the crankcase preventing the compressor from starting against a load.

A self-cleaning air cleaner keeps dirt out of the compressor.

This improved two-stage design is built in ¾-, 1½-, 3-, and 5-hp. sizes for a working pressure up to 200 lb. under continuous duty.

Marshall Automatic Voltage Regulators

ANNOUNCEMENT has been made by the Marshal Electric Company, Elkhart, Ind., of the development of an automatic voltage regulator for a.c. and d.c. generators.

It consists of a carbon pile resistance unit in series with the field of a d.c. exciter or generator. The carbon pile is compressed by gravity and released by an electromagnet. The weight of the parts and the pull of the magnet balance. No springs are used.

In conjunction with the large d.c. generators and exciters for large generators, the regulator is used to adjust the speed of an adjustable-speed motor-

driven rheostat or a large magnet-operated rheostat. There are no make-and-break contacts of any kind. The adjustment is very simple and when once set will remain.

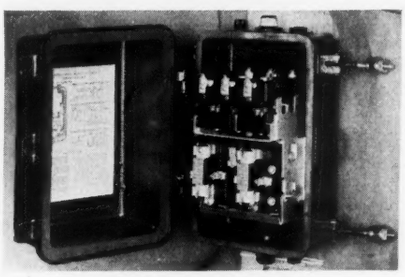
These regulators are in use as speed regulators on adjustable-speed, shunt-wound motors on paper-making machinery. They are also suitable for assisting synchronous motors in maintaining power factor.

Condit Gas-Tight Inclosures for Motor Starters

CONDIT Electrical Manufacturing Corporation, Boston, Mass., announces the development of a gas-tight inclosing case for its Types A 20 and A 30, cross-the-line air motor starters.

Cast iron is used in its construction. A gasket is provided between the cover and the case. Four heavy eye bolts and nuts hold the hinged cover tight, and provision is made for padlocking it when closed. Provision is also made for conduit connections at top and bottom.

This inclosing case is offered for installation in mines, woodworking



Condit Gas-Tight Inclosures for Motor Starters

plants, and other industries where a large amount of dust or gas may interfere with the efficient operation of a standard starter.

Rockbestos Magnet Wire

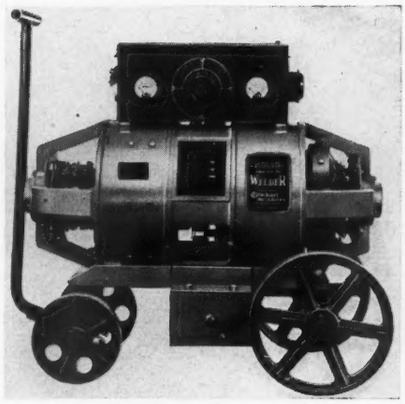
THE Rockbestos Products Corporation, New Haven, Conn., manufacturer of asbestos insulated wires and cables, announces a magnet wire with asbestos insulation having a uniform diameter no greater than double, cotton-covered magnet wire.

This magnet wire can be used in motors, coils, etc., in the same space formerly occupied by double, cotton-covered magnet wire.

Hobart "Constant Arc" Electric Welder

DESIGNATED "Constant Arc," the portable electric welder illustrated, is being manufactured by the Hobart Brothers Company, Troy, Ohio, in two ratings—200 and 300 amperes.

Each unit is driven at 1,800 r.p.m. by a special type motor built as a single



Hobart Constant Arc Welder

unit with the generator. The 200-amp. unit, No. 101, calls for a 10-hp. motor, whereas the 300-amp. machine, No. 102, utilizes a 15-hp. motor furnished to operate on two- or three-phase a.c. service, or on d.c. service if desired.

All control equipment is contained in the control panel mounted on the unit.

Complete equipment includes a head shield, an electrode holder with extra flexible cable, a ground plate, all connecting cable, a wire brush, and an assortment of metallic and carbon electrodes. The units weigh 1,100 and 1,375 lb. respectively. No. 101 measures overall 38¾ in. high, 39¾ in. long, 24¼ in. wide. No. 102 measures 43¼ in. high, 44¼ in. long, 24¾ in. wide.

Carrier Engineering "Cecolene" Degreaser

A VAPOR bath process for the degreasing of metals and other impervious materials, has been developed by the Carrier Engineering Corporation, Newark, N. J. In this process a solvent, known by the Carrier trade name as "Cecolene," is boiled and vaporized.

In the standard tank form of the apparatus the vapor rises to the level of water-cooled condenser coils around the sides near the top of the tank where it is condensed and precipitated to the bottom of the tank. Since the vapor is more than three times as dense as air there is no tendency to overflow or escape.

Objects to be degreased are suspended in the vapor, which condenses on their cold surfaces at once and runs off profusely, carrying with it all grease. The objects are kept in the vapor until they heat up to its temperature, in from 1½ to 3 min., the time depending upon the gage or weight of the metal or other material. They are then removed in a warm, perfectly dry and clean state. Any foreign matter remaining will be in the form of dust.

Objects thus degreased do not come into contact with grease previously removed from other material, since the solvent vaporizes at a temperature much lower than the grease and which remains in the liquid below. Economy results from the fact that the chlorinated solvent can be used over and over, the vapor never becoming dirty.

The vapor degreaser is to be made in standard, dip-tank units and in special designs adaptable to any size or style of continuous conveyor in line assemblies, and to steam, gas or electric heating.

Obvious uses for this device are in the degreasing of metal stampings, die castings, bolts and nuts, metal furniture, metal lacquerware, hardware of many kinds, motor parts, kitchenware, dishes, leather belts, brakebands, articles of glass, Bakelite, celluloid and many other products requiring a cleaning of grease before finishing or packing for distribution.

Cloth and porous fabrics cannot be degreased in the vapor, but anything can that is impervious enough to permit the condensed fluid to run back into the reservoir.

Weston Model 553 Heat Flow Meter

ANNOUNCEMENT has been made by the Weston Electrical Instrument Corporation, Newark, N. J., of the development of the Model 553 Heat Flow Meter.

It is a portable electrical device for the direct measurement of heat loss through surfaces, and it consists of a sensitive milli-voltmeter and three rubber belts, one of which contains a large number of thermocouples which are brought out to binding posts at the end of the belt for connection to the meter. The other two are plain rubber belts for use in equalizing the heat flow. The theory and operation of this device are described in detail in Bulletin 4800.

The meter is a four binding-post instrument with a 5-in. scale figured for three ranges; 0-240, 0-120 (B.t.u. per hr. per sq. ft.), and 0.18 millivolts. The first two ranges have 120 scale

Weston Model 553 Heat Flow Meter

divisions and the third range has 90 divisions. The resistance of the meter is 250 ohms for 18 millivolts. A compensating rheostat is provided for adjusting the instrument to room temperature.

It is inclosed in a mahogany case with a hinged cover and measures approximately 7x7x4 inches.

Westinghouse "Rectox" Battery Charger

A RECTIFIER, designated "Rectox," for charging batteries by means of copper oxide rectification is announced by the Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa. Employing the copper oxide principle this charger presents safe, and satisfactory means for charging storage batteries in all applications.

With the exception of fuses which protect both the a.c. and d.c. circuits there are no parts to wear out or replace. No chemicals or acids are used, and there is no danger of explosion or corroding fumes. The copper oxide principle of rectification takes advantage of the electrical properties of copper, coated with a layer of copper

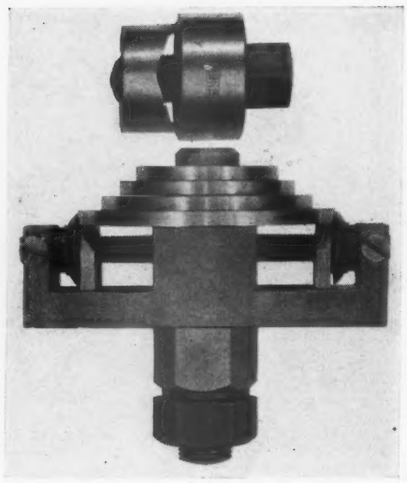
Westinghouse Rectox Battery Charger

oxide. The unit formed in this way allows electric current to pass in one direction only. Since there is no electrolytic or chemical action, the Rectox does not wear out.

Greenlee "Knockout" Punches and Cutters

TWO companion tools, No. 735 "Knockout" Punch and No. 740 "Knockout" Cutter, that will cut sheet steel up to 10 gage or ⅛ in. in thickness, have been placed on the market by the Greenlee Tool Company, Rockford, Illinois.

With the punch, cutting is done by a two-point tool, driven by screw action through the metal into a die of proper size, leaving a clean-cut hole. A complete set consists of four dies and



Greenlee No. 735 Knockout Punch, and No. 470 Knockout Cutter

punches to make ⅞-, 1 3/32-, 1⅜-, and 1 11/16-in. holes to fit ½-, ¾-, 1-, and 1¼-in. conduit. Two screws, one ⅜ and one ¾ in., are furnished for driving.

Enlarging is done by the cutter, power being applied by screw action. Cutters are mounted in the body of the tool as shown. Metal disks support the metal to be cut, the actual cut being the same size as the circumference of the disk. A complete cutter includes four metal disks for cutting 1 15/16-2⅜-, 2⅞-, and 3½-in. holes to fit 1½-, 2-, 2½-, and 3-in. conduit. Any size hole from 1 15/16 up to 3½ in. can be cut with this tool by using a disk of the proper size.

Both sets are packed in leather cases.

Goodyear "Ray Rubber"

DEVELOPMENT and perfection of a rubberized compound which will resist the penetration of X-rays and is suitable for lining of rooms in which X-ray apparatus is used, has been announced by the Goodyear Tire & Rubber Company, Akron, Ohio.

This compound, identified as "Ray Rubber," is made in sheets similar to ordinary flooring material. It is approximately ½ in. in thickness and has a factor of repellance to X-rays equivalent to that of ⅛-in. lead sheeting.

As steel nails are not impervious to X-rays, no room in which they are used for mounting the wall covering can be absolutely ray proof. The Goodyear product has the combined advantages of being ray proof and at the same time can be mounted in place by the use of cement, eliminating the use of nails altogether.

General Electric Automatic Welding Electrode Feeding Device

THE General Electric Company, Schenectady, N. Y., announces an improved feeding device on its automatic welding head.

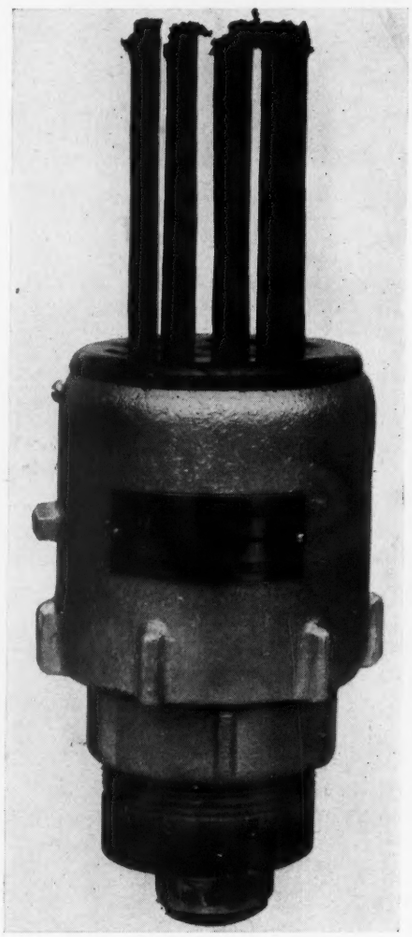
This improvement consists of the addition of geared drive to what was formerly the idler roller in the feeding mechanism. In this way the large sizes of wire, which are stiff and hard to feed without excessive pressure on the driving rolls, are positively fed without slippage, at a regular rate and with only a moderate pressure between the driving rolls.

This device also extends the uses for automatic welding by making it now possible to use curved nozzles so as to reach into otherwise inaccessible places, and to weld in abnormal positions. The improved drive roll gears furnished on heads for normal applications will accommodate any size wire from ⅛ to ¼ in. in diameter without changing gears. Below ⅛ in. the gears are not needed and it is only necessary to remove one gear—that on the drive roll shaft. Sufficient pressure can then be obtained for these small sizes of wire, by screwing down the adjustment on the binding roll.

Delta-Star Cable Terminators

THE Delta-Star Electric Company, 2400 Block Fulton St., Chicago, Ill., has developed a "Cable Terminator" for sealing the ends of low-voltage, lead covered cables where they come out of conduits.

This Terminator consists of three



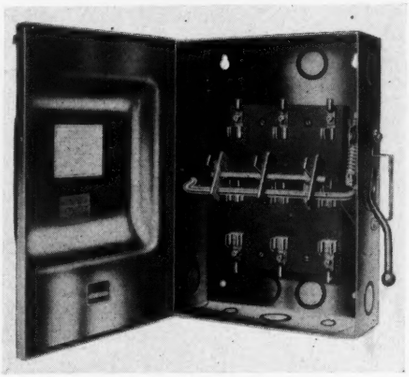
Delta-Star Type PB Cable Terminator

parts; a lower adapter screwing on to the conduit, a center coupling, and a top insulating cover. The coupling member has an internal flanged tip which compresses the belled-out lead sheath between it and the bottom adapter insuring a tight joint. The lower adapter secures an effective ground connection between the lead sheath and Terminator. After filling with compound the top insulating cover is sealed in position.

Terminators are made for all standard sizes of conduit and for either single- or multiple-conductor cable. They can also be furnished for mounting directly on the cable without conduit.

Trumbull Type C Switches Redesigned

A QUICK positive make in addition to the quick break action regularly furnished with all Type C switches, constitute the recent design changes according to an announcement from the Trumbull Electric Company, Plainville, Conn. This mechanism has a strong



Trumbull Redesigned Type C Switch

compression spring which is worked to less than 50 per cent of its maximum capacity.

In case the spring should break or be removed the switch can be thrown completely "on" and "off."

Changes in the design of the blade assembly include fiber loop straps being added which attach each blade separately to the steel operating yoke. This fiber also serves as an "on-position" stop.

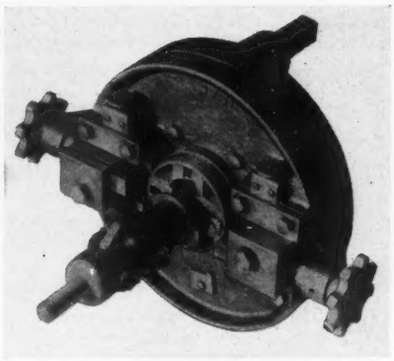
With the exception of a few catalog numbers all shipments will be of the construction described.

General Electric Mazda

ACCORDING to an announcement from the National Lamp Works of the General Electric Company, Cleveland, Ohio, National Mazda lamps, a General Electric product, will take the name of General Electric Mazda, which name will appear on the blue carton of the National Lamp Works during the coming year.

Borden "Beaver" Grooving Tools for "Victaulic" Joints

A LINE of "Beaver" grooving tools for use with "Victaulic" joints and covering a range of from ½ to 16 in. has been announced by The Borden Company, Warren, Ohio.



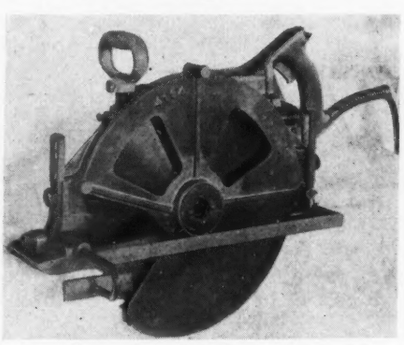
Borden "Beaver" No. 20 Grooving Tool

One patented feature has been emphasized by the manufacturer. The tools in the 2-in. size and up, lock on the pipe by means of an internal chuck, and the cutting knives cut a groove that is perfectly circular regardless of the fact that the pipe itself may be out of round.

There are five tools in the line: No. 12, for pipe from ½ to 2 in. in diameter; No. 20, 2 to 3½ in.; No. 50, 4 to 7 in.; No. 120, 8 to 12½ in., and No. 160, 14 to 16 in. The smallest size, No. 12, is for hand operation only, the larger sizes may be operated manually or by means of the Beaver Power Drive.

Speedway Portable Electric Saws, Types 183 and 184

TWO portable electric saws have been introduced by The Speedway Manufacturing Company, 1834 South 52 Ave., Cicero, Ill. Type 184, which employs a 10-in. blade, is equipped with a ¾-hp. G. E. motor and runs at a no-load speed of 1,800 r.p.m. The 12-in. saw, Type 183, has a 1-hp. motor also of G. E. design having a speed of 1,750 r.p.m. Both saws may be used on either direct or alternating current.



Speedway 12-in. Portable Electric Saw

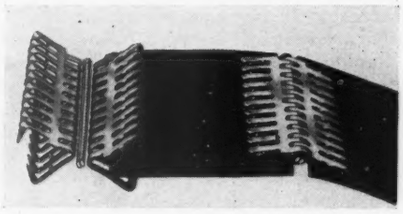
Features of both saws, as outlined in the announcement are: Slipper plate base which can be raised or lowered for adjusting depth of cut; swinging saw guard which automatically pushes back out of the way when cutting pressure is applied, and which automatically returns to guarding position the moment pressure is released. The upper portion of the saw blade is covered by saw guard of cast aluminum.

All gears and bearings are packed in grease, and according to the manufacturer, require attention only once or twice a year. The saw blades are mounted on the left side of the machine. A ripping guide is mounted on the front of the slipper plate to facilitate long cuts.

Both models are equipped with a D-type handle which is adjustable to a variant of either of two possible positions. Motor cases, handles, and slipper plates are all of cast aluminum.

Armstrong-Bray "Steelgrip" Flexible-Steel Belt Lacing

A COMPLETE line of flexible belt lacing, called "Steelgrip," has been placed on the market by Armstrong-Bray & Company, 666 Eagle St., Chicago, Ill. It is made from heat-treated steel so that the points of the lacing will go through the toughest belts. The joint of the lacing is made with a steel rocker-hinge pin, which is composed of two segments; one rocking against the other, thereby absorbing the wear at the joint when going over the pulley.



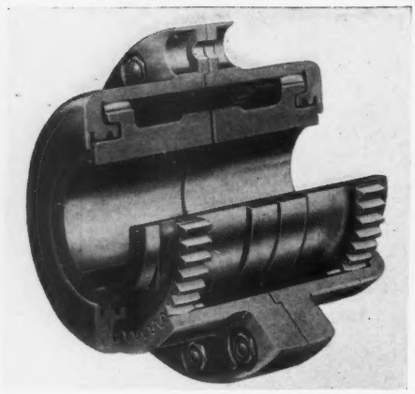
Armstrong-Bray Steelgrip Flexible-Steel Belt Lacing

Steelgrip is made for belts of from 3/16 to ½ in. thick, and for any width. All that is needed to apply it is a hammer.

Poole Engineering Flexible Coupling

IMPROVEMENTS in the standard, all-metal flexible couplings made by the Poole Engineering and Machine Company, Baltimore, Md., consist of an interchangeability of parts and a combination dust-proof and centrifugal oiling feature, which is accomplished by means of a double-flanged end plate containing within its inner-lip a deep felt packing for the exclusion of dust and dirt, the outer section being grooved and containing back drain oil holes which permit lubrication of the coupling while in motion.

The couplings are self aligning, and



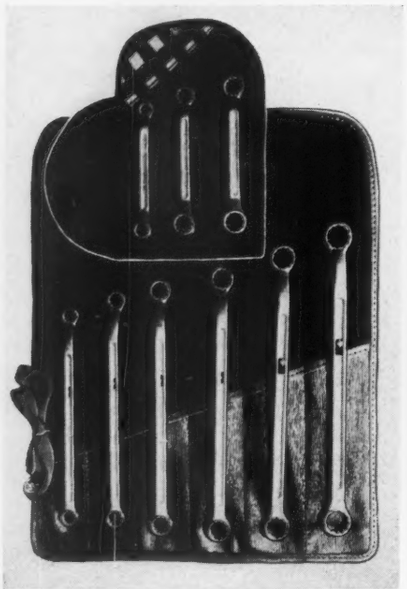
Poole Oil-Metal Flexible Coupling

carry the load on crowned gear teeth formed on the periphery of each shaft hub, which mesh with corresponding teeth on the interior of a floating and connecting sleeve member. The gear teeth are the only parts in contact and they are continually submerged in oil under centrifugal pressure while running.

Bonney Forge Wrenches

TWO wrench sets and double hexagon sockets in a complete range of sizes have been added to the line of chrome-vanadium wrench sets manufactured by The Bonney Forge & Tool Works, Allentown, Pa. The No. 29 set consists of three short-type, double-hexagon box wrenches to take care of the six most commonly used nuts and bolts. Set No. 31 consists of six double-hexagon, double-end box wrenches of the regular length for the twelve most frequently used sizes.

These wrenches are designed with double-hexagon openings, making it possible to remove nuts or bolts even though obstructions will only permit a one-twelfth turn at a "bite."



Bonney Forge Wrench Sets

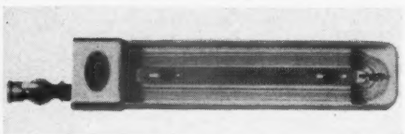
Walker Vehicle Acquires Barrett-Cravens and Automatic Transportation

ANNOUNCEMENT has been made of the linking together, in ownership and management, of Barrett-Cravens Company, 1328 W. Monroe St., Chicago, Ill., manufacturer of lift trucks, lift-truck platforms, portable elevators, and structural-steel storage racks, with the Walker Vehicle Company, Inc., Chicago, Ill. (Commonwealth Edison Company subsidiary), and the Automatic Transportation Company, Inc., Buffalo, N. Y., manufacturer of industrial electric trucks and tractors.

Meriam "Jumbo" Manometer

WITH a view to overcoming the difficulty in filling the tubes of manometers of the usual type, the Meriam Company, 1955 West 112th St., Cleveland, Ohio, placed on the market a specially designed manometer with a larger bore of tube than that generally employed.

One of the advantages of the larger bore is that the greater area largely neutralizes the capillary action of the



Meriam Jumbo Manometer

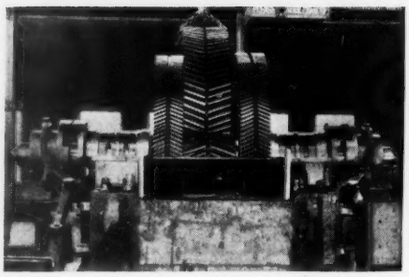
sides of the tube, thus making the tops of the liquid columns less convex or concave, and therefore easier to read correctly. The larger bore not only makes it easier to introduce the measuring liquids but also facilitates the disengagement of air bubbles which would affect the accuracy of the readings, an especially important matter when measuring the flow of large volumes of liquids or gases at low pressures. The increased size of bore does not affect the actual differential level between the two legs of the tube, because this condition depends only upon the difference in pressure between the two points to which the instrument is connected.

Gears & Forgings Two-Speed Drive

FOR the heavy-machinery field, Gears & Forgings, Inc., Cleveland, Ohio, recently designed and built the two-speed mill drive shown.

A feature of this unit is that no clutch parts are located inside of the drive. The clutch is external, attached to the intermediate shaft permitting the use of a comparatively narrow and rigid gear drive.

The prime mover is a 1,000-hp. 445/590-r.p.m. motor. The mill has a speed of 9.01/11.94 r.p.m. through one set of



Gears & Forgings Two-Speed Mill Drive

gears, and 12.01/15.93 r.p.m. through the second set of gears. The overall dimensions of the drive are 26 ft. long by 17 ft. wide. The weight is 350,000 pounds.

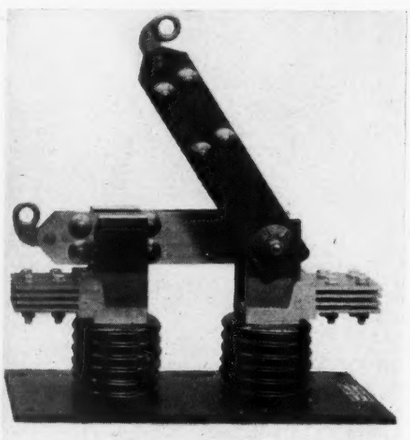
Cooper Hewitt Changes Name

ON and after January 1, the Cooper Hewitt Electric Company, Hoboken, N. J., will be known as the General Electric Vapor Lamp Company. The trade mark "Cooper Hewitt" heretofore used will be retained as the trade designation of the products manufactured by the General Electric Vapor Lamp Company.

Although formed in 1902 by George Westinghouse, Sr., and Dr. Peter Cooper Hewitt to exploit the pioneer inventions of the latter in mercury vapor apparatus, the company now specializes in the manufacture and sale of Cooper Hewitt lamps for industrial purposes, and for photographic studios, as well as quartz ultra-violet lamps, mercury switches, low-voltage Neon tube lamps, and Neon glow lamps.

Delta-Star Improved Disconnecting Switch

AN improved line of double-blade tongue-type indoor disconnecting switches has been developed by the Delta-Star Electric Company, 2400 Block Fulton Street, Chicago, Ill. A 15-kv., 3,000-amp. type is shown below.

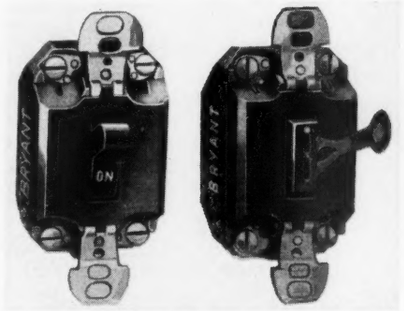


Delta-Star Double-Blade Indoor Disconnecting Switch

Each set of separately-operated blades is equipped with positive safety locks. Terminals can be provided for flat or round bars, solid or stranded wire, or copper tubing. The insulators are of the wet-process, dark-brown glazed porcelain of high mechanical strength.

Bryant Flush Tumbler Switches

A SERIES of flush tumbler switches, totally inclosed and having both cups and covers made of black Bakelite, is being offered by The Bryant Electric Company, Bridgeport, Connecticut.



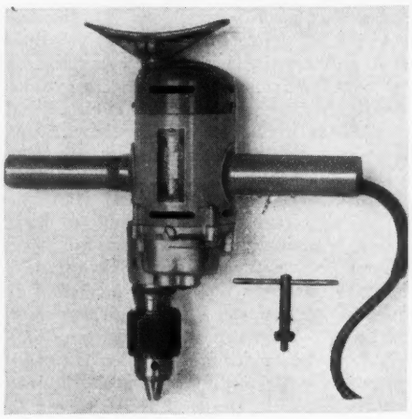
Bryant Nos. 3962 Double Pole (right left), and 3962-L Flush Tumbler Switches

Switches of this series are: No. 2961, single pole; No. 2962, double pole; No. 2963, three point; No. 2964, four point; and No. 2970, single-pole quadruple break. The latter being designed for heavy duty.

All switches of this series can be supplied with "Glo-Guide" luminous insert, or lock-type handles. Nos. 2962, double pole, and 2962-L with lock-type handle are illustrated.

Speedway Type 59 ½-Inch Electric Drill

CAPACITY to drill ½-in. holes in steel at 350 r.p.m. is embodied in the Type 59 drill announced by the Speedway Manufacturing Company, formerly the Electro-Magnetic Tool Company, 5 Great Jones St., New York, N. Y. The gear case has been so built that by a simple change of gears the tool may be provided with a varying range of speeds.



Speedway Heavy-Duty ½-In. Electric Drill

Equipment includes: Breast plate, 3-jaw Jacobs key-type chuck, extra side handle, 8 ft. of rubber-covered cord with a soft rubber split plug connection, and a heavy-duty type switch.

Duriron No. 80 Self-Priming Centrifugal Pump

A SELF-PRIMING, centrifugal pump for acid service has been introduced by The Duriron Company, Inc., Dayton, Ohio. All parts of the pump that come in contact with the liquid handled are of Duriron, other parts are protected from contact.

Fully adjustable, triple dust- and oil-sealed ball bearings are standard equipment. The bearings are so arranged on the shaft that the impeller and shaft may be removed without disturbing them. The shaft is of manganese steel and is Duriron shrouded through the stuffing box.

The impeller is of the open type, to prevent clogging when handling solutions containing solids. The self-priming feature is obtained by means of a device that permits the pump to maintain a liquid seal within itself, and thereby makes possible the pumping of liquids containing gas, entrained air, etc. At 1,750 r.p.m. the capacity is 60 g.p.m. against a 60-ft. head.

General Electric Glass-Top Fuse Plugs

THE General Electric Company, Schenectady, N. Y., has introduced through its Merchandise Department, Bridgeport, Conn., a type of fuse plug with a "Pyrex" glass top shaped as a lens, which insures clear vision and magnifies the fuse strip. As this fuse plug has a non-metallic insulated top there are no exposed metal parts when it is inserted in a cutout.

General Electric Glass-Top Fuse Plug

Lakewood Type 709 Low-Lift Truck

TYPE 709, low-lift truck of 6000-lb. capacity has recently been placed on the market by the Lakewood Engineering Company, Cleveland, Ohio. According to the announcement, special attention has been given to accessibility of the drive motor and drive axle, which are assembled as a unit so that they can be quickly dropped from the truck for adjustment or repair. The reducing mechanism is of the spur-worm type.

Lakewood Type 709 Low-Lift Truck

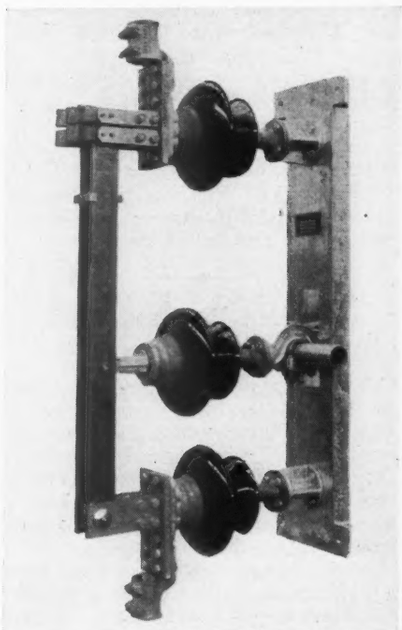
A planetary-gear reduction and lift motor making up the lifting mechanism, is assembled complete as a single unit that can be lifted quickly from the truck.

Maneuvering in a relatively small space is accomplished by means of a horizontal tiller handle controlling all four wheels. The machine is equipped with a standard platform, 54 in. long, 10½ in. high in a lowered position, and having a lift of 5 inches.

Delta-Star Type BP Multi-Pole Disconnecting Switch

THE Delta-Star Electric Company, 2400 Block Fulton St., Chicago, Ill., has developed a type of gang-operated, multi-pole switch, known as Type "BP". A single-pole element rated 15 kv., 1,600 amp., is illustrated.

By means of an inter-connected operating mechanism controlled by a common handle the pivoted center insulator pushes the blade out of and



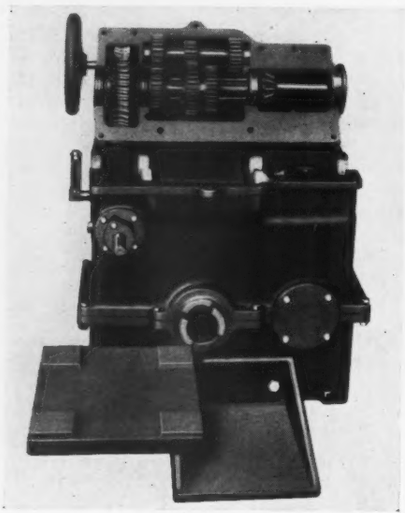
Delta-Star Type BP Gang-Operated Multi-Pole Disconnecting Switch

draws it into the floating contacts. The operating mechanism is so arranged that the center insulator unit is in toggle in both full open and closed positions. The terminal lugs are of the heavy-duty clamp type. This switch is made for a large range of voltage and current capacities.

Gears & Forgings Three-Speed Reducer

CHANGE of speeds in the three-speed reducer recently developed by Gears & Forgings, Inc., Cleveland, Ohio, is accomplished by a hand wheel operating a threaded shaft, upon which the shifting fork is mounted.

The change gear box consists of a spindled shaft, which is an extension



Gears & Forgings Three-Speed Reducer

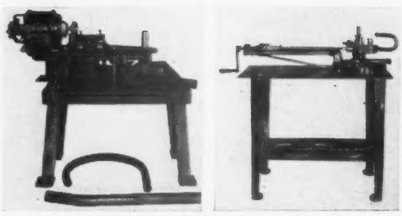
of the worm gear shaft mounted on two sets of Timken roller bearings. Also a jackshaft upon which two sets of change gears are mounted. The sliding gears on the spindled shaft engage either one of these change gears, or by means of a clutch engage the gear mounted on the worm gear shaft.

Semi-steel is used in the housing, which consists of three sections split horizontally and bolted together.

American Pipe and Tube Bending Machines

TWO types of bending devices have been placed on the market by the American Pipe Bending Machine Company, Inc., 37 Pearl St., Boston, Mass. Type H 29 Super Power is a motor-operated cold pipe bending machine, whereas Type V is a thin-gage tubing bender operated by hand.

In the power unit the pressure shoe is operated through toggles, a rotating cam, and a cam roll to bend all sizes of steel, wrought iron, brass, and copper pipe of standard gage from ¾ to 2 in. in diameter inclusive.



American Pipe and Tube Bending Machines

With the tubing bender no heating or filling is required previous to bending. This machine bends all sizes of steel, brass, and copper tubing (annealed), by means of a specially designed mandrel guide that accommodates all sizes up to 1¼ in. Each size of tubing to be bent requires four rolls, one bending disk, one mandrel rod, and one follower.

Both units are shipped fully assembled, and weigh in the order described 1,550 and 350 lb. respectively.

Parker-Kalon "Screwnail"

A NAIL combining the qualities of both a nail and screw has been introduced by the Parker-Kalon Corporation, 200 Varich St., New York, N. Y. The hardened spiral thread and needle-

Parker-Kalon Screwnail

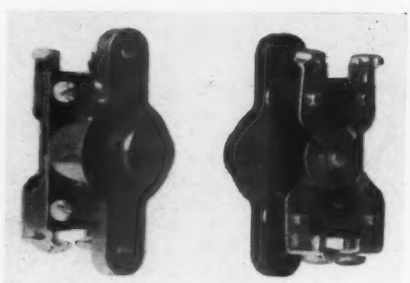
pointed pilot of the "Screwnail" enables it to be driven through much heavier sheet metal than is possible with the ordinary nail.

The hardened spiral thread forms a thread in the metal burr and wood securely fastening the sheet metal to the wood.

Westinghouse Pushbutton Units

A PUSHBUTTON unit is being offered by the Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa., for use with machine tools, elevators, conveyors, and in other applications where a control station is desired as a built-in unit.

These units are so designed that they may be conveniently grouped on control

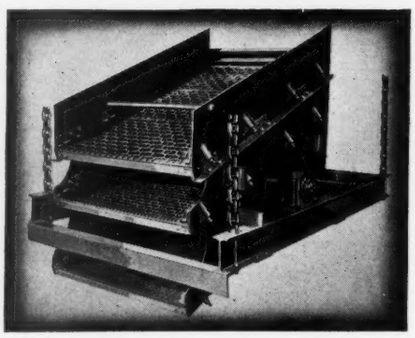


Westinghouse Pushbutton Unit

stations, and as they may be mounted directly on the cover plate, wiring is facilitated. The frame on which the mechanism is mounted is of durable black micarta, capable of withstanding hard usage. The operating button of the unit can be furnished in either black or red.

Stephens-Adamson "S-A" Vibrator Screen

FOR the screening of bulk materials, Stephens-Adamson Manufacturing Company, Aurora, Ill., announce the "SA" Vibrator, a power-actuated screen, which is built in different



Stephens-Adamson S-A Vibrator Screen

widths and lengths ranging from 2 ft. wide by 4 ft. long to 5 ft. wide by 8 ft. long, all available in the single-, double-, and triple-deck assemblies.

Four different rotor mechanisms are built for installation in the several assemblies selected according to the severity of duty.

Outstanding design features include grid-type screen support; suspended sub-frame; self-aligning ball and roller bearings; pressure lubrications; adjustable balancing device; standard screen panels; V-belt drive; and inclosed, fan-cooled motors.

Erie "Ermalite" High-Strength Wear-Resistant Cast Iron

A CAST iron, known as "Ermalite" and having a structure consisting of a pearlitic matrix in which graphite particles are distributed evenly and with practically no free cementite has been placed on the market by the Erie Malleable Iron Company, Erie, Pa. The material has a finer grain than the usual cast iron and is claimed to have good wearing properties, so much so that it is specified for brake drums.

Its tensile strength is approximately 60,000 lb. per sq. in. The transverse strength of a 1-in. round bar on 12-in. centers with a load applied at the middle of the span is 6,500 to 7,000 lb. and the deflection ranges from 0.35 to 0.40 in. The Brinell hardness ranges from 240 to 250, but the material is not brittle.

Harris Multi-Stage Regulator for Gas Cylinders

THROUGH the use of multi-stage reduction of the gas pressure in the cylinder to the pressure at the welding torch, the "Multi-Stage" regulator, manufactured by the Harris Calorific Company, Cleveland, Ohio, gives uniform pressure at the welding tip. The pressure reduction is accomplished in two stages. The first stage takes a long drop from the cylinder pressure down to a constant sub-pressure from whence the gas is passed to a second stage and then to the torch. The multi-stage reduction permits the use of proper seats of different characters, each best for its function. The first seat is used for holding the cylinder pressure of about 2,000 lb., whereas the second is used only for controlling it.

All parts of the regulator are accessible. With the adjusting screw set at the working pressure, the full cylinder

Harris Multi-Stage Regulator

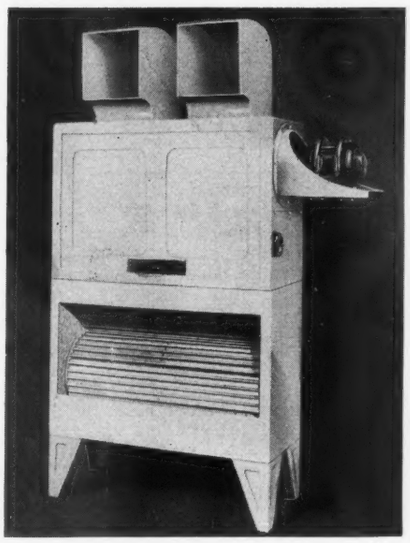
pressure may be turned on without injury to the regulator in any way. Sand and dust accumulated in cylinder valves can be blown into the regulator without disturbing its functioning, since a protective cartridge is employed.

Buffalo "Wetboy" Unit Heater

AN addition to the Buffalo Highboy and Lowboy unit-heater group, the "Wetboy," which cleans and moistens the air in addition to heating it has been announced by the Buffalo Forge Company, Buffalo, New York.

A revolving drum which consists of air washer and scrubber plates is propelled by the air current through the unit. These plates, continually dipping in a water tank provide a wetted surface through which the air must pass twice.

Dirt picked up from the air settles into the water tank and can be washed out through the drain connection by lifting the revolving drum and the hose connection. The unit contains no pump, circulating piping or auxiliary motor.



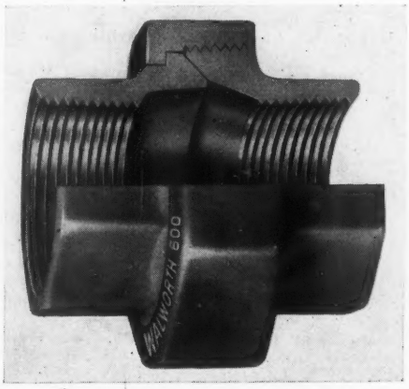
Buffalo Wetboy Unit Heater

The water level in the tank is maintained automatically by means of a float. Where an outside water connection is not available, the manufacturer claims that satisfactory results can be obtained by filling the tank manually.

The maximum width of the unit is 18 inches.

Walworth Forged-Steel Union for High Pressures

A FORGED-STEEL union designed especially for high pressures and temperatures has recently been introduced by the Walworth Company, Boston, Mass. The three parts of the union are forged from high-grade steel. A tight-fitting joint is attained by the pressure of the forged-steel, thread-end upon the forged-steel bottom on a ball-joint seat. An extra long thread connection is provided between the thread-end and ring. It is suitable for service with steam, hot oils or vapors at 600 lb. pressure and 750 deg. total temperature, and on cold water, oil, or gas at pressures up to 2,000 lb. It is available in standard pipe sizes from ⅛ to 2 inches.



Walworth Forged-Steel Union for High Pressures

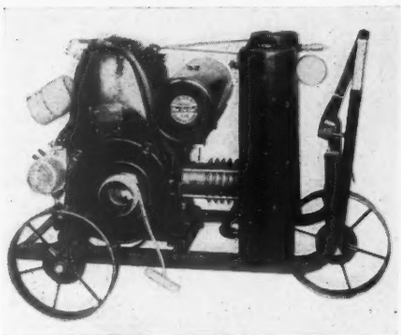
Universal Bearing Metals Acquire Bearium Bearings, Inc.

ANNOUNCEMENT has been made by the Universal Bearing Metals Corporation, 258 State Street, Rochester, N. Y., of the acquisition by purchase of all assets, processes, patents, patterns, etc., of the Bearium Bearings, Inc., manufacturer of Bearium bronze and alloys.

These products will continue to be supplied as heretofore without interruption.

Lindsay Portable Direct-Drive Compressors

OF the two small portable compressors placed on the market by P. K. Lindsay and Company, Inc., 372 Atlantic Ave., Boston, Mass., Model E-10, illustrated, is of the direct-driven gasoline type for general industrial use.



Lindsay Model E-10 Direct-Drive Compressor

Portability is provided by mounting the unit on a steel-frame, three-wheel truck.

Although the unit has a displacement of 18 c.f.m., it will operate a 3/32-in. nozzle sand blast continuously at 75-lb.; or two spray guns with air consumption of 6 c.f.m. each at 50-lb., or one 10-c.f.m. spray gun at 80-lb. pressure.

It occupies a space 2 ft. 2 in. high by 2 ft. 9 in. long by 1 ft. 3 in. wide, and weighs 190 pounds.

Milne High-Permeability Iron

AN iron claimed to have high permeability and low hysteresis loss is being imported by A. Milne & Company, 745 Washington St., New York, N. Y. The material is a Swedish charcoal, Lancashire iron product adapted for core parts where high permeability and low hysteresis loss are essential. The iron is a wrought or puddle metal and possesses altogether different properties from ingot metal.

It is obtainable in cold-drawn rounds, squares, flats, special shapes, and in cold-rolled, dead-soft annealed strips. Sizes for rounds and squares vary from 1/64 to 3 in.; for cold-rolled strips, from 0.410x3 in. wide to 0.250x6 in. wide.

TRADE LITERATURE

You Should Know About

Copies of literature which is described on this page can be obtained by writing to the manufacturer whose name and address are mentioned. It is always advisable to state the name and number of bulletin or catalog desired, as given in these columns.

(1) UNIT HEATER—Folder 2694, "Buffalo" Wetboy, a unit heater that washes and humidifies.—Buffalo Forge Company, Buffalo, N. Y.

(2) CONVEYOR SYSTEMS—36-page bulletin, "Webb Power-Driven Continuous Overhead Conveyor Systems."—Jervis B. Webb Company, 2921 E. Grand Blvd., Detroit, Mich.

(3) WELDING—"Fabrication of Welding Piping Designs," 86 pages of data with illustrations for the executive, welder foreman, and welders to enable them to apply successfully fundamental welding designs. Part I covers Procedure Control. Part II deals with Templet Layouts for pipe fittings. Part III contains tables for estimating costs.—The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, 30 East 42nd St., New York, N. Y.

(4) POWER TRANSMISSION—"The Belt that puts the Pull in the Pulley," a brief treatise on the subject of leather belting. Seventh edition, 68 pages, illustrated.—E. F. Houghton & Company, Philadelphia, Pa.

(5) METERS—Bulletin 4800 covers detailed information on Model 553 Heat Flow Meter.—Weston Electrical Instrument Corporation, Newark, N. J.

(6) MATERIALS-HANDLING EQUIPMENT—Bulletin 85C from the general catalog on "The Art of Piling—How to Pile Bales."—Revolvator Company, 336 Garfield Ave., Jersey City, N. J.

(7) GENERATORS—Bulletin 106 on improved generating sets for stationary service. Two- or three-wire direct current.—Engberg's Electric & Mechanical Works, St. Joseph, Mich.

(8) RECORDERS—Catalog 1009, Bristol's recording pressure and vacuum gages, 92 pages.—The Bristol Company, Waterbury, Conn.

(9) POWER TRANSMISSION—A wall chart, 21 x 27½ in., containing information necessary for the selection of the proper chain for any application—size, pitch, weight, tensile strength, speed, rated horse powers and load in pounds of Diamond Chain, and corresponding information on sprockets to fit various sizes of chain.—Diamond Chain and Manufacturing Company, Indianapolis, Ind.

(10) BEARINGS—Catalog 29-A, the "Cleveland Type" Lubricated Oil Film Bearing, in all styles of rigid and ball and socket mountings.—The Hill Clutch Machine & Foundry Company, Cleveland, Ohio.

(11) PUMPS—A folder lists the complete line of "Chicago" Sewage Ejectors.—Chicago Pump Company, 2336 Wolfram St., Chicago, Ill.

(12) GRINDERS—Folder F529, the "1930" series of AutoStart grinders with the chip shield, which is said to dispense with the need for goggles.—U. S. Electrical Manufacturing Company, Los Angeles, Calif.

(13) POLISHING AND PLATING EQUIPMENT—Catalog 104, 128 pages, devoted to illustrations and descriptions of all the necessary equipment and supplies used in the electroplating processes. The catalog is divided into four sections: Buffing and Polishing Supplies; Plating Supplies, Plating Equipment; and Buffing and Polishing Equipment. In addition, the catalog includes a considerable amount of technical information useful to electrical engineers and plant executives.—Hanson-Van Winkle-Munning Company, Matawan, N. J.

(14) COMPRESSORS—Form 3060, Type 30, two-stage, air-cooled, ball-bearing compressors.—Ingersoll-Rand Company, 11 Broadway, New York, N. Y.

(15) COMPENSATORS—Folder GEA 5708, CR 1034-K17,—K22,—and K37, dead-front type hand starting compensators.—General Electric Company, Schenectady, N. Y.

(16) CEMENT—"Winter Construction with 'Incor' Brand Portland Cement."—International Cement Corporation, 342 Madison Ave., New York, N. Y.

(17) ARMCO INGOT IRON—"Sheet Metal that Endures for Docks and Warehouses," 12 pages.—The American Rolling Mill Company, Middletown, Ohio.

(18) OIL CIRCUIT BREAKERS—Leaflet GEA-1173, Type FK-20 (CR-1035) oil circuit breakers up to 2,500 volts, 300 amperes.—General Electric Company, Schenectady, N. Y.

(19) TESTING INSTRUMENTS—Bulletin 1255, "Bridge-Meg" resistance tester, for 0.01 ohm to 100 megohms.—James G. Biddle, 1211-13 Arch St., Philadelphia, Pa.

(20) FLOODLIGHTING—Bulletin LD-159, 50 pages, lighting data, application and design of floodlighting equipment.—Edison Lamp Works of General Electric Company, Harrison, N. J.

(21) RESISTORS—Folder GEA 1142A, Type EW resistors for mine and industrial-haulage locomotives.—General Electric Company, Schenectady, N. Y.

(22) FLEXIBLE COUPLINGS—"Diamond-Clark Flexible Coupling," 16 pages, use and construction.—Diamond Chain and Manufacturing Company, Indianapolis, Ind.

(23) FIRE DRILLS—"Fire Exit Drills and Alarm Systems," reprinted from Building Exits Code and approved by American Standards Association as American Tentative Standard.—National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

(24) SYNCHRONOUS MOTORS—Folder 1026-JID, E-M synchronous motors for Symons Cone Crushers.—Electric Machinery Manufacturing Company, Minneapolis, Minn.

(25) PUMPS—Folder, automatic cellar drainers and electric sump pumps.—Penberthy Injector Company, 1242 Holden Ave., Detroit, Mich.

(26) TRANSFORMERS—Catalog GEA-607A, 80 pages on distribution transformers.—General Electric Company, Schenectady, N. Y.

(27) PIPING—359-page catalog, a complete line of cast-iron, malleable iron, and electric, cast-steel pipe fittings.—Stockham Pipe and Fittings Company, Birmingham, Ala.

(28) TEMPERATURE REGULATION—Three bulletins on automatic temperature control of liquids, air, gases, or vacuum.—Fulton Sylphon Company, Knoxville, Tenn.

(29) ENGINEERING ACHIEVEMENTS—Publication 1717-D, Engineering Achievements of the Westinghouse Electric and Manufacturing Company during 1929.—Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

(30) CONTROL—Folder, EC&M Time-Current Control.—The Electric Controller and Manufacturing Company, Cleveland, Ohio.

Coming Events

American Society of Heating and Ventilating Engineers—35th annual meeting, Jan. 27 to 30, 1930; Hotel Benjamin Franklin, Philadelphia, Pa.

American Institute of Electrical Engineers—Winter Convention, Jan. 27 to 30, Engineering Building, 33 West 39th St., New York, F. L. Hutchinson, Secretary.

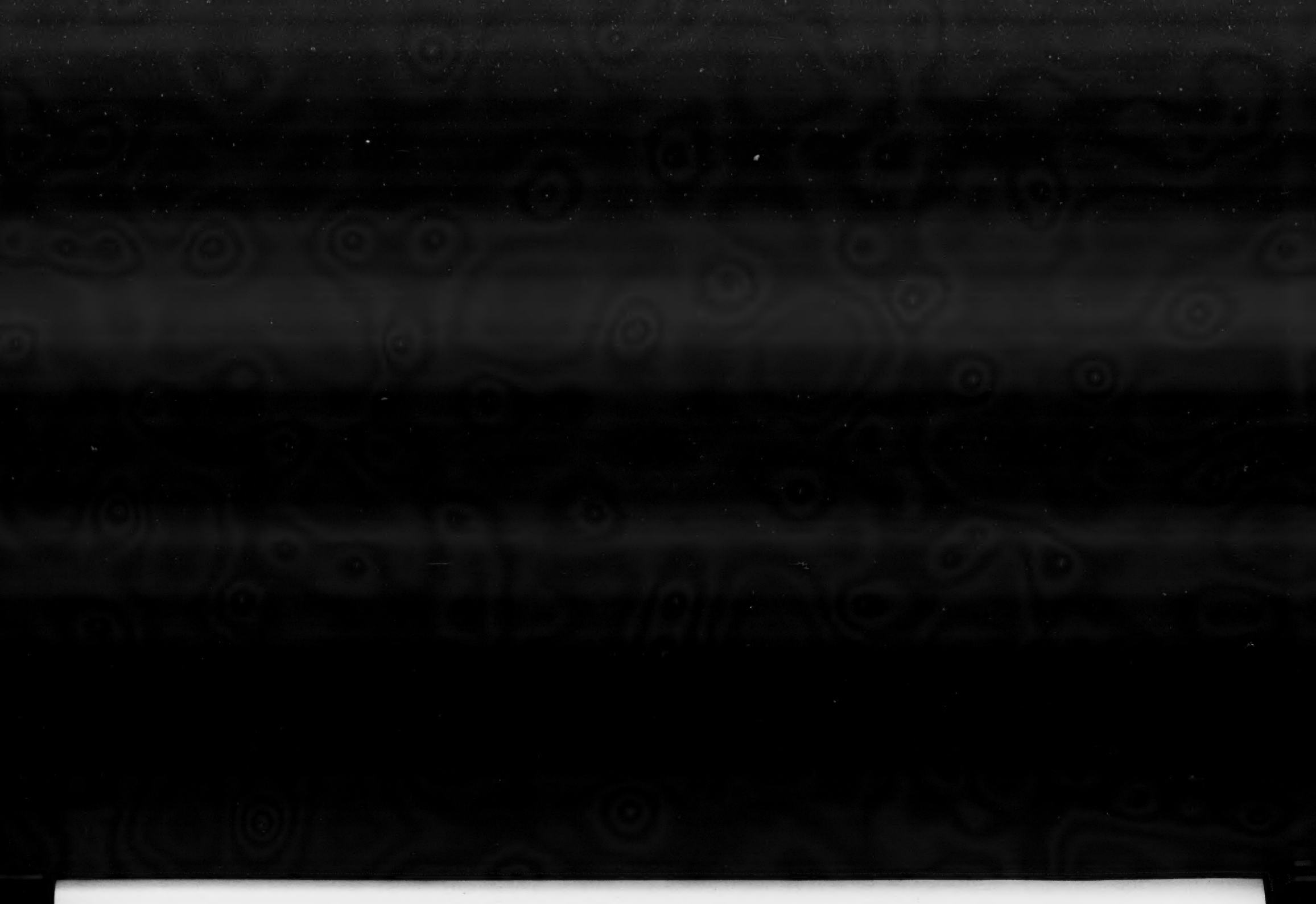
International Heating and Ventilating Exposition—To be held under the auspices of the American Society of Heating and Ventilating Engineers, Commercial Museum, Philadelphia, Jan. 27 to 31, 1930. Manager, Charles F. Roth, Grand Central Palace, New York.

National Industrial Equipment Exposition—The first national industrial equipment exposition will be held in the Hotel Stevens, Chicago, March 3 to 7, 1930. Management, Midwestern Engineering Exposition, 308 West Washington St., Chicago, Ill.

American Society of Mechanical Engineers—Fiftieth Anniversary, April 5-9, 1930. New York, Hoboken and Washington.

American Society of Mechanical Engineers — Materials-Handling Meeting, March 3 to 7, 1930. Hotel Stevens, Chicago, Ill.

National Fire Protection Association—1930 annual meeting, May 12, Atlantic City, N. J.

American Society of Mechanical Engineers—Semi-annual meeting of the Society, June 9 to 12, 1930. Hotel Book-Cadillac, Detroit, Mich.

National Electric Light Association—Annual Convention at Municipal Auditorium, San Francisco, Calif., June 16-20, 1930. Secretary, A. J. Marshall, 420 Lexington Ave., New York City.